1. What are the two most important concepts in object-oriented programming?
   a) objects and programming
   b) objects and orientation
   c) objects and classes
   d) objects and inheritance

   Answer: c  Difficulty: Easy

2. What is the difference between a method and a message?
   a) A method is a sequence of instructions that a class or object uses to perform a task, and a message is a set of instructions that tells the object what to do.
   b) A method is strictly concerned with programming and a message is strictly concerned with e-mail.
   c) A method is a prototype of how a computer should carry out a task, and a message implements the method.
   d) A method is a set of instructions to tell the object what to do, and a message is a packet of information used to communicate between two users on a network.

   Answer: a  Difficulty: Moderate

3. Which of the following terms is defined as “user-defined set of instructions that are defined for a class that Java uses to carry out basic tasks”?
   a) instance method
   b) user-defined method
   c) natural method
   d) class method

   Answer: d  Difficulty: Moderate

4. In the Java programming language, an argument is used to ________________.
a) override the object’s default method definition
b) define constants in any given program
c) provide values in messages to specify what is to be done by an object’s methods
d) perform mathematical tasks (especially algebraic) in Java

Answer: c  Difficulty: Moderate

5. How does an instance data value differ from a class data value?
   a) An instance data value is defined specifically for objects, while a class data value is defined for classes.
   b) An instance data value stores temporary values, while a class data value stores permanent values.
   c) An instance data value is defined in the object, while a class data value is defined in the class.
   d) All of the above

Answer: a  Difficulty: Moderate

6. What is the difference between a variable and a constant?
   a) A variable is used in classes and a constant is used in methods.
   b) A variable is used in objects and a constant is used in classes.
   c) A variable is defined in classes and a constant is defined in objects.
   d) A variable can change over time and a constant cannot change.

Answer: d  Difficulty: Easy

7. What are the four kinds of data values?
   a) Class variables, class constants, instance variables, and instance constants.
   b) Class variables, method variables, data variables, and instance variables.
   c) Class variables, class constants, class method variables, and instance variables.
   d) There are only two kinds: class data values, and instance data values.

Answer: a  Difficulty: Moderate
8. What is the value of inheritance? Pick the best answer.

   a) Inheritance allows a Java program to effectively utilize resources.
   b) Inheritance saves the time of having to define methods for any given class.
   c) Inheritance can be used to efficiently design two or more entries that are different but share many common features.
   d) Inheritance makes network programming in particular much easier.

   Answer: c  
   Difficulty: Hard

9. Which of the following pairs of terms are synonyms for a subclass?

   a) derived class and base class
   b) ancestor and base class
   c) derived class and ancestor
   d) descendant and derived class

   Answer: d  
   Difficulty: Moderate

10. Why might a programmer want to refrain from using inheritance?

    a) Improper use of inheritance may cause a far less comprehensible program than not using it.
    b) Inheritance tends to use more space during program execution.
    c) Inheritance uses more space compile-time.
    d) During program execution, a program using inheritance will run slower.

   Answer: a  
   Difficulty: Moderate

11. Which of the following is the correct order of the five steps of the software development cycle?

    a) Specification, design, coding, testing, debugging
    b) Design, coding, testing, analysis, operation
    c) Analysis, design, coding, testing, operation
    d) Design, analysis, operation, coding, testing

   Answer: c  
   Difficulty: Moderate
12. Which of the following describes activities carried out in the analysis phase of the software engineering cycle?
   
   a) Testing and debugging  
   b) Development of a requirements specification  
   c) Implementation of code  
   d) Program documentation  

   Answer: b  Difficulty: Moderate

13. Implementation of code is an activity associated with which of the following phases of the software engineering cycle?
   
   a) coding  
   b) testing  
   c) design  
   d) operation  

   Answer: a  Difficulty: Moderate

14. How does the quality of design affect the software maintenance cost?
   
   a) A better design leads to more maintenance, while a poor design leads to less maintenance, but neither will affect the maintenance cost.  
   b) A better design leads to higher costs, while a poor design leads to lower costs.  
   c) A poor design leads to high costs, while a good design leads to lower costs.  
   d) There is no correlation between the quality of design and software maintenance costs.  

   Answer: c  Difficulty: Moderate

15. What is the difference between unit testing and integration testing?
a) Unit testing test classes individually, while integration testing tests classes that work together.
b) Unit testing is testing for compile time errors, while integration testing is testing for run-time errors.
c) Unit testing tests the interactivity of objects, while integration testing tests the interactivity of classes.
d) Unit testing means testing every method after it is implemented, while integration testing is testing the entire program after it is completed.

Answer: a  Difficulty: Moderate

16. If we have Animal, Insect, Mammal, and Fish classes, which one will be the superclass?

   a) Animal  
   b) Insect  
   c) Mammal  
   d) Fish  

Answer: a  Difficulty: Moderate

17. Which of the following would be the best choice to make a class variable (as opposed to an instance variable) of the class Person?

   a) averageLifeExpectancy  
   b) age  
   c) gender  
   d) typeOfCarDriven  

Answer: a  Difficulty: Hard

18. Which of the following would best be declared as a constant as opposed to a variable for the class, CashRegister?
19. The name `getObject` most likely represents what type of Java construct?

   a) A Java argument
   b) A Java method
   c) A Java variable
   d) A Java class

   Answer: b    Difficulty: Hard

20. A(n) __________ must be defined before you can create an object.

   a) Identifier
   b) Object definition
   c) Class
   d) Method

   Answer: c    Difficulty: Moderate

True-False

21. True or false? In object-oriented computing, a class defines an object.

   Answer: True    Difficulty: Easy

22. True or false? An object is also known as an instance of a class.
23. True or false? An instance method is a user-defined set of instructions that perform tasks in Java specifically designed for objects.

Answer: True  Difficulty: Moderate

24. True or false? Objects in Java are restricted to responding to message senders and cannot return values to the message sender.

Answer: False  Difficulty: Moderate

25. True or false? An instance variable defined in a Java method may take on many different types.

Answer: False  Difficulty: Moderate

26. True or false? To store variable values in Java, an object uses static data values, and a class uses instance data values.

Answer: False  Difficulty: Moderate

27. True or false? The keyword “frozen” is used to make an object method into a class method.

Answer: False  Difficulty: Moderate

28. True or false? A superclass inherits classes from a subclass.

Answer: False  Difficulty: Moderate
29. True or false? Since Java is one of the pioneers of inheritance, inheritance in Java is limited to one level.

Answer: False  Difficulty: Moderate

30. True or false? Debugging is an activity associated with the testing phase of the software engineering cycle.

Answer: True  Difficulty: Moderate

31. True or false? It is normal that once a piece of software is released into the market, no further changes are made to it.

Answer: False  Difficulty: Moderate

32. True or false? Software maintenance is the name of a phase of the software engineering process.

Answer: False  Difficulty: Moderate

33. True or false? Class A inherits from Class B, which inherits from Class C. Class C is therefore a superclass of class A.

Answer: True  Difficulty: Moderate

34. True or false? A class Biped would be a subclass of the class Human.

Answer: False  Difficulty: Moderate

35. True or false? The requirements specification is a result of the design phase of the software life cycle.

Answer: False  Difficulty: Moderate
36. True of false? The output of the design phase of the software life cycle is a set of classes that will fulfill the requirements.

   Answer: True                      Difficulty: Moderate

37. True or false? Java is a procedural programming language.

   Answer: False                      Difficulty: Easy

38. True or false? Integration testing is done on individual classes.

   Answer: False                      Difficulty: Moderate

**Homework N0 2**

Multiple Choice

The following three questions are concerned with the following program which can be found in the book.

```java
1  import javax.swing.*;
2  
3  class Ch2Sample1 {
4  
5      public static void main(String[] args) {
6          JFrame myWindow;
7          myWindow = new JFrame();
8          myWindow.setSize(300,200);
9          myWindow.setTitle(“My First Java Program”);
10         myWindow.setVisible(true);
11      }
12  }
```

39. What will this program do?

   e) It will print “Hello world”.
   f) It will change the current display’s resolution on the running computer.
   g) It will resize the topmost window in your operating system.
   h) It will create a 300 x 200 pixel window.
40. Which line represents the creation of the object where a constructor is used?

   e) 6  
   f) 7  
   g) 8  
   h) 9  

Answer: b  Difficulty: Moderate

41. Which line represents an object declaration?

   e) 1  
   f) 3  
   g) 5  
   h) 6  

Answer: d  Difficulty: Moderate

42. What is the difference between programmer-defined classes and standard classes?

   e) Programmer-defined classes are always written after standard classes.  
   f) Programmer-defined classes can be named anything the user chooses, while standard classes have strict formatting regulations.  
   g) Programmer-defined classes are written by the programmer, while standard classes are built into Java.  
   h) Programmer-defined classes are written by the programmer, while standard classes are created automatically after compilation.  

Answer: c  Difficulty: Easy

43. What is the purpose of a program diagram?

   e) To aid in the design and comprehension of a program with a visual representation of the program.
f) It is the result of a program that creates and initializes a JFrame object.
g) To draw dependency relationships between methods.
h) To help distinguish which classes are programmer-defined and which are standard classes.

Answer: a  Difficulty: Moderate

44. In a particular Java package, Student and Teacher are class names. Which of the following is NOT a valid variable declaration?

   e) Student Bob;
   f) Teacher Sally;
   g) Teacher Student;
   h) Student Regina, Jenny;

Answer: c  Difficulty: Moderate

45. Which of the following is not a valid Java identifier?

   e) ABC$$$
   f) hello_kitty
   g) 2Jim#
   h) a123_456

Answer: c  Difficulty: Moderate

46. According to standard naming conventions, which pair of (class, object) is least acceptable?

   e) (Student, jane)
   f) (Teacher, jBob123_)
   g) (Material, Rubber)
   h) (A123, unknown)

Answer: c  Difficulty: Hard

47. Object creation in Java utilizes the keyword _____________.


48. Which of the following shows the syntax for object creation for a defined object?

   e)  <object name> = new <arguments> ( <class name> ) ;
   f)  <class name> = new <object name> ( <arguments> ) ;
   g)  <object name> = <class name> <identifier> ;
   h)  <object name> = new <class name> ( <arguments> ) ;

   Answer: d  Difficulty: Hard

49. How does object declaration differ from object creation?

   e)  In object declaration space is allocated in memory for the object, while in object creation, the identifier of the object is set to refer to a space in memory.
   f)  In object declaration, an identifier is created, while in object creation, the actual object is created.
   g)  In object declaration, an identifier of an object is set to refer to a space in memory, and in object creation, the space in memory is actually created for the object.
   h)  Other than the fact that the syntax of the two operations differs, they perform the same function of creating the object.

   Answer: a  Difficulty: Hard

50. In computer science, what is meant by garbage collection?

   e)  Deallocation of unused memory space.
   f)  Going through the program and fixing erroneous code.
   g)  Deletion of objects from memory.
   h)  Defragmentation of the disk drive.

   Answer: a  Difficulty: Moderate
51. Assume `getAge` is a method of the `Person` class and Katie is a `Person` object. Which of the following represents a valid method call?

   e) `katie.getAge(Person);`
   f) `katie = Person.getAge();`
   g) `katie.getAge();`
   h) `Person = katie.getAge();`

Answer: c    Difficulty: Moderate

52. What are the three types of Java comments?

   e) single-line comment markers, comment markers, and javadoc comments
   f) single-line comment markers, double-line comment markers, and triple-line comment markers
   g) single line comment markers, double-line comment-markers, and multi-line comment markers
   h) javadoc comments, header comments, and single-line comments

Answer: a    Difficulty: Moderate

53. What does a header comment do?

   e) Clarifies a particular line of code
   f) Describes the function and design of the program or method
   g) Allows for a publishable Java documentation document
   h) Summarizes a block of code

Answer: b    Difficulty: Moderate

54. To import a package named tools located in directory, `./packages/` one would write the line of code, ____________.

   e) `import packages;`
   f) `import tools;`
   g) `import packages/tools;`
55. Fill in the blank. A valid constructor of a class, “Driveway”, is:

```java
________ Driveway{
    int length;
}
```

e) int
f) import
g) class
h) Driveway

Answer: c Difficulty: Moderate

56. When a Java program runs, which of the following methods is run first?

e) The main method
f) The executable method
g) The class method
h) The helper methods

Answer: a Difficulty: Moderate

57. Which of the following is the syntax for a method declaration?

e) <return type> <modifiers> <method name> ( <parameters> ) {  
    <method body>
}
f) <modifiers> <method name> ( <parameters> ) {   
    <method body>
}
g) <return type> <method name> ( <parameters> ) {   
    <method body>
}
h) <modifiers> <return type> <method name> ( <parameters> ) {   
    <method body>
}
58. Which of the following blocks of code defines two strings, x and y, which both contain the string “helloworld”, and concatenates y to the end of x?

   e) String x,y;
      x = y = “helloworld”;
      x = x+y;

   f) String x = “helloworldhelloworld”;

   g) String x = “helloworld”;
      String y = “helloworld”;
      x = String.concatenate(x,y);

   h) String x,y;
      x = y = “helloworld”;
      x = y-x;

Answer: a    Difficulty: Moderate

True-False

59. True or false? Multiple objects of the same type can be declared on a single line.

Answer: True    Difficulty: Easy

60. True or false? Java Standard classes are defined and implemented by the programmer.

Answer: False    Difficulty: Moderate

61. True or false? A dependency relationship is a construct used to illustrate interdependencies in a database.

Answer: False    Difficulty: Moderate
62. True or false? The following code:
   Customer bob, jane, sally;
   is a valid variable declaration.
   Answer: True
   Difficulty: Moderate

63. True or false? abc_123_$_ is a valid Java identifier.
   Answer: True
   Difficulty: Moderate

64. True or false? A class named B$$$ follows Java standard naming convention.
   Answer: True
   Difficulty: Moderate

65. True or false? The syntax of object creation is
   <class name> = new <object name> ( <arguments> );
   Answer: False
   Difficulty: Moderate

66. True or false? The following is a valid object declaration and creation:
   Hardware printer = new Printer();
   Answer: False
   Difficulty: Moderate

67. True or false? In a method call, it is not necessary to send an argument to the object.
   Answer: True
   Difficulty: Moderate

68. True or false? The following line of code is a valid Java comment:
   // I am a comment //
   Answer: True
   Difficulty: Hard
69. True or false? Comments are necessary for a program to function.

   Answer: False          Difficulty: Easy

70. True or false? One way to declare a JFrame object of name myJFrame is:
    javax.swing.JFrame myJFrame;

   Answer: True          Difficulty: Moderate

71. True or false? To define a class named Dishware, with a class variable of type
    String and name, “material” one would use the following block of code:
    class Dishware {
        String material;
    }

   Answer: True          Difficulty: Moderate

72. True or false? Three tools are necessary to program in Java: a text editor, a
    compiler, and a run-time engine.

   Answer: True          Difficulty: Moderate

73. True or false? To run a program, one would type into a shell:
    javac <program name>.

   Answer: False          Difficulty: Moderate

74. True or false? The two types of errors are compilation errors and coding errors.

   Answer: False          Difficulty: Moderate
75. The documentation for the standard classes is known as the application programming interface.

Answer: True   Difficulty: Easy

76. True or false? An applet is a type of program that focuses on database management.

Answer: False   Difficulty: Moderate

77. True or false? The Java keyword, null carries the meaning that there is no value.

Answer: True    Difficulty: Moderate

78. True or false? The following code will output “case”

String x = “pillowcase”;
String y = x.substring(7,10);
System.out.println(y);

Answer: False   Difficulty: Moderate

**Homework N0 3**
Multiple Choice

The following five questions refer to the program below:

```java
1  class Student {
2        private String studentName;
3        public static void main(String[] args){
4           Student student1 = new Student(“Marshall Mathers”);
5           student1.printInfo();
6        }
7
8        public void Student(name){
9            studentName = name;
10       }
```
11
12 public void printInfo()
13     System.out.println(studentName);
14 }

79. Assume the program compiles successfully and is run. What is the output?

   i) Marshall Mathers
   j) studentName
   k) name
   l) Student

   Answer: a Difficulty: Moderate

80. Which of the following would be most appropriate to insert at line 11?

   i) //class Student
   j) //prints the student’s name
   k) //Data Member
   l) public static void main(String[] args)

   Answer: b Difficulty: Moderate

81. At which line does the main method begin?

   i) 1
   j) 2
   k) 3
   l) 8

   Answer: c Difficulty: Easy

82. Assume line 12 was replaced with the line
    private void printInfo()
    How would this affect the output of the program?

   i) It will print a blank line
   j) It will print “Marshall Mathers”
k) It will not compile because the compiler will complain of access violations.
l) It will compile but throw a runtime error because of access violations.

Answer: b  Difficulty: Moderate

83. Why is the class member, studentName declared private? (Choose the best answer.)

  i) So that no classes outside of Student can interfere and use the studentName object.
  j) Because all class members are required to be declared private.
  k) Because it facilitates record keeping.
  l) Because the programmer wishes to protect the program against hackers wanting to steal vital information.

Answer: a  Difficulty: Moderate

84. Assume a program uses a Class, FurnitureStore, which contains a method called “getSize” that is used as follows:
   FurnitureStore fs = new FurnitureStore(30, “LazyBoy”);
   int size = fs.getSize();

Which of the following is the prototype for the getSize method?

  i) public void getSize(int);
  j) public static void getSize();
  k) public int getSize();
  l) public int getSize(int);

Answer: c  Difficulty: Moderate
85. Assume we want to write a program that calculates the sum of two numbers. Fill in the blank:

```java
public int getSum(int a, int b){
    int sum = a + b;
    return sum;
}
```

i)  return a;
j)  return
k)  return sum;
l)  return getSum;

Answer: c   Difficulty: Moderate

86. The following method:
```java
public int getSize(){
    return this.size;
}
``` is a(n) ________________.

i)  constructor
j)  mutator
k)  accessor
l)  None of the above

Answer: c   Difficulty: Moderate

87. The following method in the class, TissueBox:
```java
public TissueBox(){
}
``` is a(n) ________________.

i)  constructor
j)  accessor
k)  mutator
l)  None of the above

Answer: a   Difficulty: Moderate
88. The commonly acceptable class listing convention is

```
class <class name> {
    ________________________.
}
```

i) data members
methods
constructor
j) constructor
data members
methods
k) methods
data members
constructor
l) data members
constructor
methods

Answer: d Difficulty: Moderate

89. How would one compile and run the completed Java program titled Hello.java?

i) compile: javac Hello.java
   run: java Hello
j) compile: javac Hello
   run: Hello
k) compile: java Hello.java
   run: java Hello.class
l) compile: javac Hello.java
   run: java Hello.class

Answer: a Difficulty: Moderate

90. Assume we have the following Java method.

```java
public double computeVolume(int height, float length, double depth){
    return (double) (height * length * depth);
}
```

Which of the following is NOT a valid call to computeVolume?
i) double x = computeVolume(1,2,3);
 j) double x = computeVolume(1,2.3,4.4);
 k) double x = computeVolume(1.1,2.2,3.3);
 l) double x = computeVolume(1,2.345,4.567890123);

Answer: c                Difficulty: Moderate

91. The practice of writing multiple constructors to handle different sets of inputs is known as _____________.

   i) inheritance
   j) polyinputting
   k) overloading
   l) multiplicity

Answer: c                Difficulty: Moderate

92. What happens at compile-time if the programmer forgets to include a constructor in the class definition?
   i) The constructor is not necessary, so the compilation carries through regularly.
   j) A constructor with a body is automatically generated.
   k) An error occurs, complaining about the lack of a constructor method for the class.
   l) A default constructor with no arguments and no body is created.

Answer: d                Difficulty: Moderate

93. What do we call programmers who make programs that use other program’s programmer-defined classes?
   i) secondary programmers
   j) client programmers
   k) plagiarizers
   l) there is no special term for this type of programmer

Answer: b                Difficulty: Moderate
94. The practice of hiding the details from the user of what goes on inside of an Object is known as ____________.

   i) polymorphism  
   j) inheritance  
   k) encapsulation  
   l) access modification

Answer: c    Difficulty: Moderate

95. Assume you had a class, BankInfo that contained three class member objects: accountNumber, pinNumber, and name. The name object must be searchable by other classes. What access modifiers would you apply to these members?

   i) make accountNumber private, pinNumber private, and name public  
   j) make accountNumber public, pinNumber private, and name public  
   k) make them all private  
   l) make them all public

Answer: a    Difficulty: Hard

96. In the UML for Java programs, how are public and private methods distinguished?

   i) With the access modifiers, public and private  
   j) With the abbreviations, pub, and priv  
   k) + for public and – for private  
   l) * for public and / for private

Answer: c    Difficulty: Moderate

97. Assume we wish to include a class constant to be shared by all objects of a specific class type, as in:

   private final double temp = 32.0;
What is wrong with this?

i) There is nothing wrong with this.

j) It should be declared public

k) temp is a reserved word

l) It is missing the keyword, static.

Answer: d  Difficulty: Moderate

Consider the following method for the next two questions

```java
public int compute(int amt){
    int temp = amt*4;
    return temp + amt*2;
}
```

98. How would you characterize temp?

i) A local variable

j) A class variable

k) An argument

l) A return type

Answer: a  Difficulty: Moderate

99. How would you characterize amt?

a) A local variable

b) A class variable

c) An argument

d) A return type

Answer: c  Difficulty: Moderate

True-False

100. True or false? A class must have a main method.
101. True or false? A class’s data members must be declared private.
   Answer: False

102. True or false? A private variable can only be used by methods of the same class.
   Answer: True

103. True or false? Constructor methods never accept arguments.
   Answer: False

104. True or false? Accessor methods always have a return value.
   Answer: True

105. True or false? An argument is a value we pass to a method, and a parameter is a placeholder for arguments.
   Answer: True

106. True or false? Data members of two different objects can point to a mutual object.
   Answer: True
107. True or false? When we pass an object to a method, in order to change that object, we must pass a copy of the object as opposed to a reference to the object.

Answer: False Difficulty: Moderate

108. True or false? The practice of overloading a constructor method is known as encapsulation.

Answer: False Difficulty: Moderate

109. True or false? Every class must contain a constructor in order for it to compile.

Answer: False Difficulty: Moderate

110. True or false? This constructor is invalid:

```
public int ClassA(int one){
...
}
```

Answer: True Difficulty: Moderate

111. True or false? A client program uses its own class’s methods.

Answer: False Difficulty: Moderate

112. True or false? In the program diagram, a + represents a public access modifier.

Answer: True Difficulty: Moderate

113. True or false? The static modifier causes a method or variable to be shared by all instances of the class.
114. True or false? Class variables should always be declared private.
    Answer: False   Difficulty: Moderate

115. True or false? There is a problem with this declaration:
    ```java
class Something {
    private final int STH = 12;
}
```
    Answer: True   Difficulty: Moderate

116. True or false? Good coding practice means minimization of the duplication of code.
    Answer: True   Difficulty: Moderate

117. True or false? A user of a program can run java <program name> on a class without a main method.
    Answer: False   Difficulty: Moderate

Homework N0 4

Multiple Choice

118. What are the three Java repetition statements?
    m) if
    switch
    while
    n) for
    switch
do
119. Which of the following is the valid syntax for the while statement?

m) while (<initialization>, <stopping condition>, <increment>)
   <statement block>

n) while (<conditional>)
   do
   <statement block>

o) do <statement block>
   while (<conditional>);

p) <statement block>
   while (<conditional>);

Answer: b  Difficulty: Moderate

120. We want to write a program that will print “all is well” on 100 different lines. How can we implement this with a while loop?

m) a = 0;
   while (a <= 100)
       System.out.println(“all is well”);

n) int a = 1;
   while (a < 100)
       System.out.println(“all is well”);

o) int a = 0;
   while (a < 100)
       System.out.println(“all is well”);

p) while (a = 0; a < 100; a++)
   System.out.println(“all is well”);

Answer: c  Difficulty: Moderate
121. Suppose we wish to write a program that will continually prompt for a number from the user until the input variable, “number” is greater than 10. What will the while loop look like?

m) while (number > 10)
   number = Integer.parseInt(JOptionPane.showInputDialog(null, “Enter a number”));
n) while (number > 10){
   number = Integer.parseInt(JOptionPane.showInputDialog(null, “Enter a number”));
   number ++;
}
o) while (number <= 10){
   number = Integer.parseInt(JOptionPane.showInputDialog(null, “Enter a number”));
   number ++;
}
p) while (number <= 10)
   number = Integer.parseInt(JOptionPane.showInputDialog(null, “Enter a number”));

Answer: d    Difficulty: Moderate

122. The reading of a value before the conditional inside a loop tests that value is known as a(n) _____________.

m) priming read
n) assumed input
o) anticipated read
p) blind conditional

Answer: a    Difficulty: Moderate

123. What is the difference between a sentinel-controlled loop and a count-controlled loop?

m) A count-controlled loop is executed for a fixed number of times while a sentinel-controlled loop is executed infinitely.
n) A count-controlled loop uses the numerical increment operator ++, while the sentinel-controlled loop uses Boolean expressions.
o) A count-controlled loop is executed for a fixed number of times while a sentinel-controlled loop is executed repeatedly until a certain value is encountered.

p) A count-controlled loop does not take user input in its body, while a sentinel-controlled loop does.

Answer: c    Difficulty: Moderate

124. What is wrong with the following code?
    ```
    int product = 0, count=0;
    while (product < 2500){
        product *= 5;
        count++;
    }
    ```

m) the syntax of the while statement is invalid.

n) the operator, *=, does not exist.

o) it has an infinite loop

p) the count variable is initialized incorrectly.

Answer: c    Difficulty: Moderate

125. What will happen when the following code is executed?
    ```
    int i = 1;
    while (i != 10)
        i = i*3;
    ```

m) the program will hang up and never end.

n) an overflow error will occur

o) a type mismatch error will occur

p) the program will complete normally

Answer: b    Difficulty: Moderate

126. Why should we not use non-integer real numbers as counters in loops?

m) they are not allowed in loops

n) they are slower and less efficient than integers

o) they use more memory

p) a slight imprecision in repeating numbers can cause the loop to repeat infinitely.
127. Which of the following is not a pitfall in loop writing?

m) null pointer exceptions  
n) imprecise loop counter  
o) off-by-one pitfall  
p) infinite loops

Answer: a  Difficulty: Moderate

128. What is the most efficient way to write the priming read?

m) Write it before the loop of choice.  
n) Use a for loop  
o) Use a while loop  
p) Use a do-while loop

Answer: d  Difficulty: Hard

129. What is the syntax of the do-while loop?

m) do ;
   <statement>
   while ( <Boolean expression> )

n) while ( <Boolean expression> )
   do
   <statement>;

o) do
   <statement>
   while ( <Boolean expression> );

p) do
   <statement>
   while (<Boolean expression>)

Answer: c  Difficulty: Moderate
130. Consider the following block of code:

```java
int a = 1;
while (a < 5) {
    System.out.println(a);
    a++;
}
```

What will be the output of this program?

m) 1
   2
   3
   4
   5

n) 1
   2
   3
   4

o) 2
   3
   4
   5

p) 2
   3
   4

Answer: b Difficulty: Moderate

131. What is meant by a loop-and-a-half repetition control?

m) It means the loop always continues for one and a half iterations only.

n) It means the loop uses the do-while loop model.

o) It means the conditional statement for loop termination is checked in the middle of the loop.

p) It means the loop repeats indefinitely.

Answer: c Difficulty: Moderate

132. Why is loop-and-a-half repetition control frowned upon in the programming community?

m) Because it violates the one-entry one-exit principle
n) Because it causes far more errors
o) Because it is more difficult to code
p) Because it causes slower execution when the code runs

Answer: a  Difficulty: Moderate

133. What is the syntax of the for loop?

m) for (<update>;<initialization>)
   <statements>

n) for (<initialization>;<Boolean expression>;<update>)
   <statements>

o) for (<Boolean expression>)
   <statements>

p) for (<initialization>;<update>)
   <statements>

Answer: b  Difficulty: Moderate

134. In the following for statement:
for (int i = 0; i < 99; i++)
a += i;

i is the ______________.

m) local variable
n) parameter
o) argument
p) control variable

Answer: d  Difficulty: Moderate

135. Consider the following program:

for (int i = 1; i <= 10; i++)
for (int j = 1; j <= 10; j++)
   System.out.println(“1”);
How many lines of output will be printed?

m) 1  
n) 10  
o) 20  
p) 100

Answer: d    Difficulty: Moderate

136. A programmer writes the following in his Java file:

method name goes here;  
while (the user inputs a valid number)  
    perform appropriate computation on the number

print the number out  
end while loop

What he wrote is an example of ___________.

m) simplified coding  
n) erroneous code  
o) commenting  
p) pseudocode

Answer: d    Difficulty: Moderate

137. Which of the following is not a step in the process of estimating the running time of a loop statement?

m) Record the start time by creating a Date object before the loop statement  
n) Record the end time by creating a Date object after the loop statement  
o) Record the time in the middle of the loop by creating a Date object  
p) Subtract endtime from the start time to get the elapsed time

Answer: c    Difficulty: Moderate
138. True or false? A repetitive method is a method that calls itself.
   Answer: False  Difficulty: Easy

139. True or false? The three types of loops in Java are for loops, while loops, and do loops.
   Answer: False  Difficulty: Easy

140. True or false? In a while loop, the loop body comes before the Boolean expression.
   Answer: False  Difficulty: Moderate

141. True or false? A count-controlled loop is executed for a fixed number of times.
   Answer: True   Difficulty: Moderate

142. True or false? The “printing read” is reading of a value before testing the conditional in a loop.
   Answer: False  Difficulty: Moderate

143. True or false? In a sentinel-controlled loop, the loop body is executed repeatedly until a designated value is encountered.
   Answer: True   Difficulty: Moderate

144. True or false? The following program:
    public int gcd(int m, int n){
int last = Math.min(m,n);
int gcd;
int i = 1;
while (i <= last){
    if (m % i == 0 && n % i == 0){
        gcd = i;
    }
    i++;
}
return gcd;

is the most efficient way to compute the greatest common denominator.

Answer: False                     Difficulty: Hard

145. True or false? The Euclidian solution to the greatest common
denominator problem is suitable for recursion.

Answer: True                     Difficulty: Hard

146. True or false? One of the pitfalls in writing a loop is using an imprecise
loop counter.

Answer: True                     Difficulty: Moderate

147. True or false? An infinite loop will ever end unless the user manually
breaks out of it in the operating system.

Answer: False                    Difficulty: Moderate

148. True or false? A pretest loop tests the condition before the loop body is
executed.

Answer: True                     Difficulty: Moderate

149. True or false? For loops are more versatile than do-while and while loops.
150. True or false? Loop-and-a-half control means the test condition is placed at the end of the loop body.

Answer: False   Difficulty: Moderate

34. True or false? The showConfirmDialog method of the JOptionPane class returns a value that corresponds to the button clicked by the user.

Answer: True   Difficulty: Moderate

35. True or false? Any program that uses a nested for loop can be implemented without nested loops.

Answer: True   Difficulty: Hard

36. True or false? Any loop can be implemented using a recursive method.

Answer: True   Difficulty: Hard

37. True or false? Nested loops are especially useful for filling and creating multi-dimensional tables.

Answer: True   Difficulty: Moderate

38. True or false? The field width is the number of characters allocated to a space occupied by an output value.

Answer: True   Difficulty: Moderate

39. True or false? Pseudocode is a necessary phase in the design and coding process.
40. True or false? Any useful recursive method must contain at least one conditional statement.

Answer: True    Difficulty: Hard

Homework N0 5
Multiple Choice

1. What is meant by “returning an object” from a method?
   a) It means you are returning a null value to the caller.
   b) It means returning a primitive type to the caller.
   c) It means returning the object’s address to the caller.
   d) It means returning the object’s value to the caller.

Answer: c    Difficulty: Moderate

2. If an object calls a method, and a new object is created within that method and returned to the caller, the object returned ________________.
   a) Has the same address and the same value as the object that called the method.
   b) Has a different address and possibly a different value from the object that called the method.
   c) Has the same address and possibly a different value from the object that called the method.
   d) Has a different address but the same value from the object that called the method.

Answer: b    Difficulty: Moderate

3. What is wrong with the following block of code? (assume Bag is defined).
   class New {
   Bag b;
   }
public void getBag()
{
    return b;
}

a) The accessor method needs a different return value.
b) b has not yet been initialized.
c) The class needs more methods
d) The method getBag needs more statements.

Answer: a    Difficulty: Moderate

4. Assume we wanted to make a constructor method in the class, “Nuts”.

class Nut {
    String typeOfNut;
    public void Nut(String typeOfNut){
        __________________;
    }
}

How would you set the class variable to the argument passed into Nut? Fill in the blank.

a) typeOfNut = typeOfNut;
b) this = typeOfNut;
c) this.typeOfNut = typeOfNut;
d) You must change the name of the parameter for this constructor to work properly.

Answer: c    Difficulty: Moderate

5. The keyword “this” is a(n) ____________.

a) Boolean expression
b) access modifier
c) variable
d) self-referencing pointer

Answer: d    Difficulty: Moderate
6. Consider the following code.

```java
   class Example{
   public void method1()
   }
   public void method2{
     method1();
   }
   public void Example()
   }
}
```

What does the compiler do to line 5 when the program is compiled?

a) the compiler changes the call to method1 to this.method1()
   b) the compiler adds a default constructor
   c) the compiler ignores this call since it is an invalid method call.
   d) the compiler does not add or delete any code

Answer: a                  Difficulty: Moderate

7. How could a programmer stick to common practice with respect to initializing class variables through constructors?

a) use the same name for the parameter corresponding to the class variable as for the class variable
   b) use a different name for the parameter corresponding to the class variable as for the class variable
   c) Always include multiple constructors.
   d) Use the keyword, this, as much as possible.

Answer: b                  Difficulty: Hard

For the next three questions, consider the following code:
```
public double computeDensity(double mass, PhysicalObject po){
   return mass/po.getVolume();
}
public double computeDensity(PhysicalObject po, double volume){
   return po.getMass()/volume;
}
```

8. Describe what is going on in these two methods.
a) One method computes the mass of an object while the other computes the volume of an object, given the density.
b) Both methods return the density of an object by accessing the density class variable in the object.
c) Both methods compute the density of an object, by dividing mass by volume, which are provided through arguments.
d) Both methods compute the density of an object by using either mass or volume and a physical Object provided through arguments.

Answer: d  Difficulty: Moderate

9. Notice that both methods have the same name. What is this practice called?

   a) encapsulation  
b) overloading  
c) method signatures  
d) iteration

Answer: b  Difficulty: Moderate

10. What condition enabled this practice (two methods with the same name) to work?

   a) The methods have a different number of parameters.  
b) The parameters are of different data types and have a different number of parameters.  
c) The parameters are of different data types even though the number of parameters is the same.  
d) The technique is not valid in this case.

Answer: c  Difficulty: Moderate

11. A method signature is _________________.

   a) The method’s accessibility status.  
b) The method’s name and return value.  
c) The return value of the method.  
d) The name of the method and the number and types of its parameters.

Answer: d  Difficulty: Moderate
12. Why would a user want to create multiple constructors?

a) Multiple constructors are easier to write than a single constructor.
b) The Java compiler expects multiple constructors.
c) Multiple constructors give the client more flexibility in creating instances.
d) Programs with multiple constructors are easier to read than a single constructor.

Answer: c  Difficulty: Moderate

13. In the following code:

```java
class Q14{
    private int number;
    public Q14(Q14 q){
        setNumber(q.number);
    }
    public void setNumber(int passednumber){
        number = passednumber;
    }
}
```

The constructor is an example of a(n) _____________.

a) erroneous constructor
b) default constructor
c) copy constructor
d) overloaded constructor

Answer: c  Difficulty: Moderate

14. In the following constructor:

```java
public Function(int hello){
    this();
    myInt = hello;
}
```

The use of “this()” _____________.

a) is a reference to hello
b) is bad style
c) is illegal
d) is a call to a Function constructor

Answer: d  Difficulty: Moderate

15. Which of the following keywords is used to define a class method?

a) static
b) void
c) main
d) this

Answer: a  Difficulty: Moderate

16. Which of the following would be a call to the class method, “print” (no parameters) in class, “Printer”? 

a) Printer.print();
b) this.print();
c) Printer a;
    a.print();
d) Printer(print);

Answer: a  Difficulty: Moderate

17. Which of the following scenarios illustrates a suitable time to use a class variable in the class, “CarManufacturer”? 

a) we need a String to store the name of the vehicle
b) we need an integer to store the total number of cars sold
c) we need an integer to store the vehicle identification number
d) we need an integer to store the horsepower of the vehicle.

Answer: d  Difficulty: Hard
18. What are the steps to making a programmer-defined package?

a) Include the statement: package <name>.  
   Modify the CLASSPATH environment variable.  
   Include the statement import <name>.

b) Copy the class file to the destination folder  
   Modify the CLASSPATH

b) Create the package  
   Import the package

d) Include the statement: package <name>  
   Make sure the class is public  
   Create a folder with the same name.  
   Place the class in the folder  
   Modify the CLASSPATH

Answer: d    Difficulty: Moderate

19. Which of the following is not a javadoc tag?

   a) @author  
   b) @param  
   c) @pseudo  
   d) @return

Answer: c    Difficulty: Moderate

True-False

20. True or false? Returning objects from methods is the same as returning primitive types from methods.

   Answer: False    Difficulty: Easy

21. True or false? Consider the following code:

   ```java
   public Fraction simplify() {
       Fraction simp;
       simp = new Fraction();
       return simp;
   }
   ```
This code is legal, and therefore one can define objects within methods of the same class.

Answer: True                Difficulty: Moderate

22. True or false? Consider the following method:
    public Fraction simplify() {
        int num = getNumerator();
        int denom = getDenominator();
        int gcd = gcd(num, denom);
        Fraction simp = new Fraction(num/gcd, denom/gcd);
        return simp;
    }
The returned object occupies the same memory space as the object calling the method.

Answer: False                Difficulty: Moderate

23. True or false? When calling a method within another method, and when both methods are in the same class, a “this” keyword is required.

Answer: False                Difficulty: Moderate

24. True or false? Java convention tells us to use the same name for parameters and for data members.

Answer: False                Difficulty: Moderate

25. True or false? Given the method:
    public void add(Fraction frac){
        int a,b,c,d;
        a=this.getNumerator();
        b=this.getDenominator();
        c=frac.getNumerator();
        d=frac.getDenominator();
        setNumerator(a*b + c*b);
        setDenominator(b*d);
    }
It is valid to make this call:
f3 = f1.add(f2);

Answer: False  Difficulty: Moderate

26. True or false? If two methods have a different number of parameters, then they can share the same name.

Answer: True  Difficulty: Moderate

27. True or false? It is possible in Java to have more than one constructor method per class.

Answer: True  Difficulty: Moderate

28. True or false? Overloading constructors is not a useful practice in programming.

Answer: False  Difficulty: Moderate

29. True or false? The following constructor:
   public Yes(){
       this(0);
   }
   is legal as long as there is another constructor with the signature,
   public Yes(int i);

Answer: True  Difficulty: Moderate

30. True or false? It is legal to create three constructors as follows:

   public ClassX(int X){
   }
   public ClassX(float X){
   }
   public ClassX(intY, int X){
   }
31. True or false? To call a static method, one uses the following syntax:
   <ClassName>.<method name>;
   Answer: True   Difficulty: Moderate

32. True or false? A static initializer is a valid replacement for a constructor method.
   Answer: False   Difficulty: Hard

33. True or false? Instance methods cannot call all other methods of the same class.
   Answer: False   Difficulty: Hard

34. True or false? Class methods cannot call instance methods of the same class.
   Answer: True   Difficulty: Hard

35. True or false? Class methods can access only the class variables and the class constants of the class.
   Answer: True   Difficulty: Moderate

36. True or false? In the call-by-value scheme, the memory location of an argument is passed into the parameter of a method.
   Answer: False   Difficulty: Moderate

37. True or false? The number of arguments in any method call must match the number of parameters in the method definition.
38. True or false? All arguments are passed into a method by using the pass-by-value scheme.

   Answer: True   Difficulty: Moderate