وزارة التعليم العالي
جامعة الملك سعود
عمادة السنة التحضيرية

King Saud University
Preparatory Year Deanship
Math Skill Department
First Semester

Chapter P

Math 130 (PreCalculus)
Benchmarks
Time Allowed: 90 Minutes
1431/1432

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

Answer the question.

1) Consider the numbers $13, \sqrt{7}, -16, 0, \frac{2}{3}, \sqrt{16}, 0.\overline{4}, 0.08$ Which are rational numbers?

2) Consider the numbers $\sqrt{8}, -20, -1, \frac{1}{2}, \sqrt{9}, 0.\overline{8}, 0.68$. Which are irrational numbers?

3) Consider the numbers $-14, -\sqrt{76}, -108, \frac{9}{8}, -\sqrt{9}, 5.\overline{2}$. Which are rational numbers?

4) Consider the numbers $-5, -\sqrt{78}, 956, \frac{2}{1}, -\sqrt{9}, 5.\overline{4}$. Which are irrational numbers?

Find the set if the universal set $U = \{-8, -3, -1, 0, 2, 4, 5, 6, 7, 9\}$, $A = \{-8, -3, -1, 2, 5\}$, $B = \{-3, 2, 5, 7\}$, and $C = \{-1, 4, 9\}$.

5) $B \cup C$

6) $A \cup C$

7) $A \cap B$

8) $(A \cap B) \cup C$

9) $(B \cup C) \cap A$

10) B'

11) $(A \cup B)'$

12) $(A \cap C)'$

13) $(A \cap C)'$

14) $B' \cap C'$

Use the absolute value to express the distance between the points with coordinates a and b on the number line. Then determine this distance by evaluating the absolute value expression.

15) a = 1 and b = -12

16) a = 23 and b = 0

Rewrite the expression without absolute value bars.

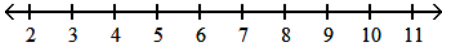
17) $|-2|$

18) $|7 - \sqrt{2}|$

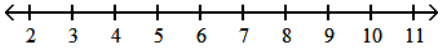
19) $||-8| + |-2||$

Graph the interval on a number line and write the inequality notation as well.

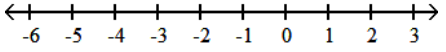
20) $(5, \infty)$



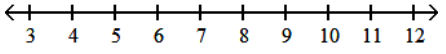
21) $(-\infty, 6)$



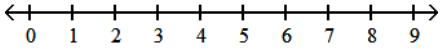
22) $[-2, \infty)$



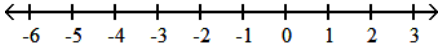
23) $(-\infty, 7]$



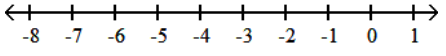
24) [2, 5]



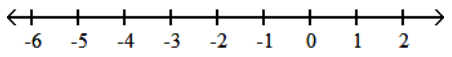
25) (-4, -1]



26) [-6, -3)



27) $\left(-1, \frac{9}{5}\right]$



Evaluate the expression for the given values.

28) $6(x + 1) + 15$ $x = -5$

29) $\frac{7xy + 40}{x}$ $x = 5, y = 7$

30) $|6x - 7y|$ $x = 4, y = 5$

31) $\frac{|x|}{x} + \frac{|y|}{y}$ $x = 3, y = -1$

32) $\frac{y - 5x}{6x + xy}$ $x = -1, y = 2$

Determine the domain of the expression. Write the domain in interval notation.

33) $\frac{x}{x - 5}$

34) $\frac{x - 8}{x - 3}$

35) $\frac{-8}{x + 6}$

36) $\frac{x}{x(x - 1)}$

37) $\frac{-4x}{2x^2 + 3}$

Evaluate the expression. Write your answer without negative exponents.

38) $2^{-1} - 4^{-1}$

39) $(-3)^{-2}$

Simplify the expression. Write your answer without negative exponents. Whenever an exponent is negative or zero, assume that the base is not zero.

40) $(5^{-8}) \cdot (5^{6})$

41) $(-7x^{5})(2x^{8})$

42) $\frac{x^{11}}{x^2}$

43) $\frac{12x^{-5}y^8}{6x^6}$

44) $(x^{-7})^{-3}$

45) $\left(-\frac{1}{9}\right)^{-3}$

46) $(5x^4)^{-3}$

47) $\left(\frac{2x^3y^{-3}}{x^{-5}y^4}\right)^{-3}$

Use the rules of exponents to simplify the expression. Use positive exponents to write the answer.

48) $(-4x^{-7}y^{-5})^2$

49) $\frac{x^7(x^{-6})^{-9}}{(x^{-7})^{-8}}$

50) $\frac{x^{-6}(x^5)^{-2}}{(x^{-6})^{-7}}$

Perform the indicated operations. Write the resulting polynomial in standard form.

51) $(4x^2 + 2x - 14) + (4x + 14)$

52) $(2x^6 - 9x^5 + 10) - (7x^6 + 13x^5 - 3)$

53) $9(2x^3 + x^2 - 1) - 3(4x^3 + 5x + 2)$

54) $-7x(3x + 6)$

55) $(x + 5)(x - 12)$

56) $(x - 12)(x^2 + 8x - 7)$

57) $(3x - 4)^2$

58) $(x - 7)(x^2 + 7x + 49)$

59) $(x + 12y)(x - 6y)$

60) $(x + 11y)(x - 11y)$

61) $(5x - y)^2$

Factor the polynomial by removing any common monomial factor.

62) $8x + 56$

63) $5x^3 + 10x$

64) $18ax^7 + 6ax^4 + 42ax^2$

Factor by grouping.

65) $x^3 + 3x^2 + 5x + 15$

66) $x^4 - 2x^3 - 6x^2 + 12x$

Factor the trinomial or state that the trinomial is irreducible.

67) $x^2 - x - 72$

68) $x^2 - x - 40$

69) $15x^2 + 16x + 4$

Factor the polynomial as a perfect square or state that it is irreducible.

70) $x^2 - 6x + 9$

71) $4x^2 + 4x + 1$

72) $25x^2 + 70x + 49$

Factor the polynomial as the difference of two squares or state that it is irreducible.

73) $x^2 - 16$

74) $81x^2 - 64$

75) $x^4 - 1$

76) $81x^4 - 16$

Factor the polynomial as the sum or difference of two cubes.

77) $x^3 - 1000$

78) $x^3 + 729$

Factor the polynomial completely. If a polynomial cannot be factored, state that it is irreducible.

79) $2x^3 + 4x^2 - 16x$

80) $75x^4 - 147x^2$

Simplify the rational expression. Find all numbers that must be excluded from the domain of the simplified rational expression.

81) $\frac{2 - x}{x - 2}$

82) $\frac{x^2 - 36}{x - 6}$

83) $\frac{2x + 3}{10x^2 + 21x + 9}$

84) $\frac{x^2 + 5x + 6}{x^2 + 11x + 18}$

Multiply. Simplify and leave the numerator and denominator in your answer in factored form.

85) $\frac{3x}{6x + 3} \cdot \frac{8x + 4}{3}$

86) $\frac{8x - 2}{2x + 6} \cdot \frac{x + 3}{12x - 3}$

87) $\frac{x^3 + 1}{x^3 - x^2 + x} \cdot \frac{3x}{-18x - 18}$

Divide and/or multiply as indicated. Simplify and leave the numerator and denominator in your answer in factored form.

88) $\frac{21x - 21}{5} \div \frac{7x - 7}{30}$

89) $\frac{x^2 - 25}{x^2 - 8x + 16} \div \frac{10x - 50}{x^2 - x - 12}$

90) $\frac{x^2 - 14x + 49}{11x - 77} \div \frac{10x - 70}{110}$

Add and subtract as indicated. Simplify and leave the numerator and denominator in your answer in factored form.

91) $\frac{3x}{x - 6} - \frac{18}{x - 6}$

92) $\frac{4x + 2}{4x + 9} + \frac{4x + 16}{4x + 9}$

93) $\frac{x^2 + 25}{x^2 + 4x - 21} + \frac{10x - 4}{x^2 + 4x - 21}$

94) $\frac{5x + 5}{x^2 - 5x - 24} - \frac{4x + 2}{x^2 - 5x - 24}$

Perform the indicated operations and simplify the result. Leave the numerator and denominator in your answer in factored form.

95) $\frac{1 - \frac{6}{x}}{1 + \frac{6}{x}}$

96) $\frac{x - \frac{x}{x + 9}}{x + 8}$

Evaluate the radical expressions or indicate that the root is not a real number.

97) $\sqrt{25}$

98) $\sqrt[5]{-243}$

99) $\sqrt[3]{(5)^3}$

Simplify the expression using the product and quotient properties of square roots. Assume that any variables represent positive real numbers.

100) $\sqrt[3]{x^8}$

101) $\sqrt[3]{\frac{256x^4}{4x}}$

102) $\sqrt[4]{\sqrt{x}}$

Simplify the expression. Assume that all variables represent nonnegative real numbers.

103) $4\sqrt{6} + 2\sqrt{6}$

104) $-7\sqrt{147} + 7\sqrt{48} + 8\sqrt{75}$

105) $\sqrt{3x^2} - 6\sqrt{75x^2} - 3\sqrt{75x^2}$

Rationalize the denominator.

106) $\frac{7}{\sqrt{7}}$

107) $\frac{4}{7 - \sqrt{2}}$

108) $\frac{2}{\sqrt{5} + \sqrt{7}}$

109) $\frac{5 - \sqrt{2}}{5 + \sqrt{2}}$

110) $\frac{1}{\sqrt{3} + 2x}$

Evaluate the expression without using a calculator.

111) $16^{1/4}$

112) $(-32)^{1/5}$

113) $\left(-\frac{1}{125}\right)^{-2/3}$

Simplify the expression, leaving your answer with only positive exponents. Assume that all variables represent positive numbers.

114) $(x^3)^{7/3}$

115) $(x^6y^8)^{-1/2}$

Convert the radical expression to its rational exponent form and then simplify. Assume that all variables represent positive numbers.

116) $\sqrt[6]{x^5} \cdot \sqrt[3]{x^2}$

117) $\sqrt[3]{\sqrt{3}}$

Convert the given product to a single radical. Assume that all variables represent positive numbers.

118) $\sqrt{3} \cdot \sqrt[3]{4}$

119) $\sqrt[3]{4} \cdot \sqrt[5]{3}$

120) $\sqrt{5} \cdot \sqrt[5]{4}$