Name: ID: Course: Group:

Notes:
1- This homework covers from chapter 1 to chapter 7.
2- Deadline: 21-10-2021   Time: 15:00

1 - 9 ■ Choose the correct answer:

1 The foci of the ellipse $\frac{(x-1)^2}{36} + \frac{(y-1)^2}{20} = 1$ are:
(A) $F_1(1,5)$ and $F_2(1,-3)$
(B) $F_1(5,1)$ and $F_2(-3,1)$
(C) $F_1(4,1)$ and $F_2(-2,1)$
(D) $F_1(2,1)$ and $F_2(-3,1)$

2 The foci of the ellipse $\frac{(x-1)^2}{9} + \frac{(y-1)^2}{25} = 1$ are:
(A) $F_1(1,5)$ and $F_2(1,-3)$
(B) $F_1(5,2)$ and $F_2(-3,2)$
(C) $F_1(5,2)$ and $F_2(1,2)$
(D) $F_1(5,1)$ and $F_2(-5,1)$

3 The focus of the parabola $(x+1)^2 = -4(y-1)$ is
A) $F(1,1)$ B) $F(0,-1)$ C) $F(-1,0)$ D) $F(-1,4)$

4 The focus of the parabola $2y^2 - 4y + 8x + 10 = 0$ is
A) $F(2,1)$ B) $F(2,2)$ C) $F(1,-2)$ D) $F(-2,1)$

5 The directrix of the parabola $(x+1)^2 = -4(y-1)$ is
A) $y = 2$ B) $x = -2$ C) $y = -2$ D) $x = 2$

6 The equation of the parabola with vertex $(2,1)$ and focus $F(2,3)$ is
A) $(x-2)^2 = -8(y-1)$ B) $(y-2)^2 = 8(x-1)$ C) $(x-2)^2 = 8(y-1)$ D) $(y-2)^2 = -8(x-1)$

7 The equation of the hyperbola with foci at $(-1,-6)$ and $(-1,4)$, and the length of its transverse axis 8 is
A) $\frac{(y+1)^2}{16} - \frac{(x+1)^2}{9} = 1$ B) $\frac{(y+1)^2}{9} - \frac{(x+1)^2}{16} = 1$ C) $\frac{(y-1)^2}{16} - \frac{(x-1)^2}{9} = 1$ D) $\frac{(y+1)^2}{16} - \frac{(x-1)^2}{9} = 1$

8 If A= $\begin{bmatrix} 1 & 1 & 4 & 1 \\ 0 & 2 & 2 & 5 \\ 0 & 0 & 5 & 3 \\ 0 & 0 & 0 & 7 \end{bmatrix}$, then $det(A)$ is equal to
(A) 35   (B) 70   (C) 0   (D) 12

9 If A= $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 3 & -3 & 0 & 0 \\ 4 & 1 & 2 & 0 \\ -1 & 2 & 7 & 5 \end{bmatrix}$, then $det(A)$ is equal to
(A) 15   (B) 0   (C) -30   (D) 10

10 If A $= \begin{bmatrix} 2 & 1 \\ -1 & 3 \end{bmatrix}$ and B $= \begin{bmatrix} 4 & 1 \\ 5 & -1 \end{bmatrix}$, then $2A + 3B$ is equal to:

A) $\begin{bmatrix} 16 & 5 \\ 13 & 3 \end{bmatrix}$ C) $\begin{bmatrix} 8 & -1 \\ 4 & 9 \end{bmatrix}$

B) $\begin{bmatrix} 12 & 1 \\ 4 & 8 \end{bmatrix}$ D) $\begin{bmatrix} -8 & 1 \\ -17 & -9 \end{bmatrix}$

11 - 14 ■ Determine the elements of the conic section and sketch its graph.

11 $(x-1)^2 = 8(y+1)$

12 $\frac{x^2}{100} + \frac{y^2}{49} = 1$

13 $\frac{(x+3)^2}{16} + \frac{(y-2)^2}{9} = 1$

14 $y^2 - 5x^2 + 6y - 40x - 76 = 0$

15 - 24 ■ If A = $\begin{bmatrix} 1 & 3 & 2 \\ 5 & -4 & 6 \\ 0 & 9 & 2 \end{bmatrix}$, B = $\begin{bmatrix} 5 & 0 \\ 1 & 4 \\ 10 & 11 \end{bmatrix}$ and C = $\begin{bmatrix} -2 & 0 \\ 0 & 7 \\ 5 & 3 \end{bmatrix}$, compute the following (if possible):

15 $B+C$

16 $2B+3C$

17 $C-B$

18 $A-C$

19 AB

20 BA

21 A^t

22 $(3A)^t$

23 $det(A)$

24 $det(2A)$

25 - 26 ■ Use Cramer's rule to solve the system of linear equations

25 $x+y+z = 18$
$x-y+z = 6$
$x+y-z = 4$

26 $2x-4y+3z = 10$
$3x+y-2z = 6$
$x+3y-z = 20$

27 - 28 ■ Use Gauss elimination method to solve the system

27 $x+y+z = 18$
$x-y+z = 6$
$x+y-z = 4$

28 $x+y+z = 12$
$x-y = 2$
$x-z = 4$

29 - 30 ■ Use Gauss-Jordan method to solve the system

29 $x-3y+z = 21$
$4x+2y+z = 14$
$3x+3y+z = 7$

30 $2x-4y+3z = 10$
$3x+y-2z = 6$
$x+3y-z = 20$

31 - 44 ■ Evaluate the integral.

31 $\int \sec^2(3x-5)\, dx$

32 $\int \frac{dx}{\sqrt{16-x^2}}$

33 $\int (x^2+3x+1)\, dx$

34 $\int (2x^2+x-1)\, dx$

35 $\int_2^2 (6x^2+3)\, dx$

36 $\int (x^3 - 4x^4)\, dx$

37 $\int x\sqrt{x^2+1}\, dx$

38 $\int \left(\frac{1}{x-2} + \frac{2}{x+1}\right) dx$

39 $\int (1+\sqrt{\cos x})^2 \sin x\, dx$

40 $\int (x^{\frac{3}{2}}+1)\, dx$

41 $\int \frac{2}{\sqrt{x}}\, dx$

42 $\int x\cos x^2\, dx$

43 $\int \frac{\csc^2 \sqrt{x}}{\sqrt{x}}\, dx$

44 $\int \frac{\sec x + \tan x}{\cos x}\, dx$

45 - 48 ■ Sketch the region bounded by the graphs of the given equations, then find its area.

45 $y = x + 2$ and x-axis over $[-2, 1]$

47 $y = x^2 + 1$ and $y = x + 1$ from $x = 0$ to $x = 1$

46 $y = x^2$, $y = 4$

48 $y = \ln x$, $y = 0$, $x = e^2$

49 - 52 ■ Sketch the region R bounded by the graphs of the given equations and find the volume of the solid generated by revolving R about x-axis.

49 $y = 2x$ and x-axis over $[0, 1]$

51 $y = x^2$, $y = 9$

50 $x = y + 1$, $x = 2y - 3$, $x = 1$, $x = 3$

52 $y = x^2$, $y = x$

53 - 56 ■ Find f_x, f_y, f_{xx} and f_{yy}.

53 $f(x, y) = 2x^4 y^3 - xy^2 + 3y + 1$

55 $f(x, y) = x^3 \ln y + xy^4$

54 $f(x, y) = 4e^{x^2 y^3}$

56 $f(x, y) = x^3 y - y^3 x$

57 - 60 ■ Solve the differential equation.

57 $x^2 dy + y^2 dx = 0$

59 $xy' - y = x^2 e^{-x}, x > 0$

58 $xy' - y = x^3 e^x$

60 $2y' - y = 4$