Math 110 All Sections Exam 4
April 1st -7th
Winter 2010

1. Which one of the conics is represented by the equation $x^2 - 4x + 3y^2 - 6y - 2 = 0$

   a) hyperbola b) parabola c) ellipse d) circle e) none of the above

2. Find the asymptotes of the hyperbola $\frac{y^2}{9} - \frac{x^2}{16} = 1$

   a) $y = \pm\frac{3}{4}x$ b) $y = \pm\frac{4}{3}x$ c) $y = \pm 4x$ d) $y = \pm 3x$

3. Find the center of the ellipse given by the equation $x^2 + 4y^2 - 2x + 16y + 13 = 0$

   a) (1,2) b) (-2,-2) c) (-2,2) d) (1,-2) e) (-1,2)

4. Solve the following system of equations. Find the product $x \cdot y$

$$\begin{cases} 2x - y = 3 \\ 3x + 2y = 8 \end{cases}$$

   a) $x \cdot y = -4$ b) $x \cdot y = -2$ c) $x \cdot y = 0$ d) $x \cdot y = 2$ e) $x \cdot y = 4$

5. Solve the following system of equations. Find y.

$$\begin{cases} x + 2y + 3z = 1 \\ x + 3y + 2z = 8 \\ x + y + z = 3 \end{cases}$$

   a) $y = -4$ b) $y = -1$ c) $y = 0$ d) $y = 1$ e) $y = 4$

6. $\dfrac{-2}{x(x-1)} = \dfrac{A}{x} + \dfrac{B}{x-1}$ Find the product $A \cdot B$

a) $A \cdot B = -16$ b) $A \cdot B = -4$ c) $A \cdot B = 0$ d) $A \cdot B = 2$ e) $A \cdot B = 4$

7. Which expression should be used to find the partial fraction decomposition of $\dfrac{x^2 - 3x + 5}{x(x-1)(x+1)^2}$

a) $\dfrac{A}{x^2 + 4x - 2} + \dfrac{B}{x} + \dfrac{C}{(x+1)^2}$

b) $\dfrac{A}{x} + \dfrac{B}{x-1} + \dfrac{C}{(x+1)} + \dfrac{Dx+E}{(x+1)^2}$

c) $\dfrac{A}{x} + \dfrac{B}{x+1} + \dfrac{C}{(x+1)^2}$

d) $\dfrac{A}{x} + \dfrac{B}{x-1} + \dfrac{C}{(x+1)} + \dfrac{D}{(x+1)^2}$

e) $\dfrac{A}{x} + \dfrac{B}{x-1} + \dfrac{Cx+D}{(x+1)^2}$

8. How many solutions of the following system of equations are there?

$$\begin{cases} \dfrac{x^2}{9} + \dfrac{y^2}{25} = 1 \\ x^2 - 1 = y \end{cases}$$

a) 0 b) 1 c) 2 d) 3 e) 4

9. Solve the following system of equations. What is the sum of all possible y value(s)?

$$\begin{cases} x^2 - y^2 = 7 \\ x + y = 1 \end{cases}$$

a) -4 b) -3 c) 0 d) 3 e) 4

10. Find the second term in the sequence defined by $\left\{ \dfrac{(-4)^n}{n+2} \right\}$

a) 1/2 b) 4 c) 16 d) -2 e) 1

11. Find the sum $\sum_{n=1}^{4} 3^n$

a) 12 b) 30 c) 81 d) 120 e) none of the above.

12. The sequence given by $a_n = 3(n-1)$ is:

a) geometric
b) arithmetic
c) both arithmetic and geometric
d) neither arithmetic nor geometric

13. Find the 101st term of the arithmetic sequence {2, 8, 14, 20, . . . }

a) 398 b) 602 c) 620 d) 662 e) 1212

14. Find the arithmetic sum $2 + 5 + 8 + \ldots + 101$

a) 116 b) 1734 c) 1751 d) 1750

15. What is the sum of the first five terms of the sequence defined by the recursive equations:

$$s_1 = 1,\ s_n = 2s_{n-1}$$

a) 16 b) 15 c) 31 d) 63 e) none of the above

16. The first term of a geometric sequence is 2 the common ratio is 3. What is the 4^{th} term?

a) 54 b) 24 c) 162 d) 18 e) none of the above

17. Find the infinite geometric sum $1 + \frac{1}{4} + \frac{1}{4^2} + \frac{1}{4^3} \ldots$

a) $\frac{4}{5}$ b) $\frac{4}{3}$ c) $\frac{3}{4}$ d) $\frac{\sqrt{2}}{2}$

18. In using mathematical induction to prove that

$$1^2 + 2^2 + 3^2 + \ldots + n^2 = \frac{n(n+1)(2n+1)}{6}$$

what term must be added to the left side of the equation when n is replaced by n + 1.

a) n b) n^2 c) $(n+1)$ d) $2n+1$ e) $(n+1)^2$ f) $(2n+1)^2$

19. Let A = {1,2,5,6,8,9}, B = {1,2,5,7,9}, and C = {0,2,6,7,8,9}. Find $(A \cup B) \cap C$.

a) {2, 9} b) {2, 8, 9} c) {2, 6, 7, 8, 9} d) { 0, 1, 2, 4, 7, 8, 9}

20. Let $n(C)$ = the number of elements in a set C. If A and B are sets and if $n(A \cap B) = 15$, $n(A) = 27$ and $n(B) = 21$. Find $n(A \cup B)$.

a) 6 b) 48 c) 42 d) 36 e) 27 f) 33

Answers

1. C
2. A
3. D
4. D
5. E
6. B
7. D
8. C
9. B
10. B
11. D
12. B
13. B
14. C
15. C
16. A
17. B
18. E
19. C
20. F