

Math 110 Exam 4

April 2-8, 2015

Altered

Instructions:

- DO NOT WRITE on the exam.
- Choose the one choice that best completes the statement or answers the questions.
- Fill in the answer to each problem on your computer-scored answer sheet.
- There is no time limit.
- No books, notes, or calculators allowed.

1. What are the vertices of $4x^2 + 3y^2 + 8x - 6y = 2$?

a. $(1, -1 - \sqrt{3}), (1, -1 + \sqrt{3})$ b. $(-1, 1 + \sqrt{3}), (-1, 1 - \sqrt{3})$ c. $(-1, 4), (-1, -2)$

d. $(\frac{1}{2}, 1), (-\frac{5}{2}, 1)$ e. $(\frac{5}{2}, -1), (-\frac{1}{2}, -1)$ f. $(\frac{5}{4}, 1), (-\frac{13}{4}, 1)$

2. Which is a focus of $(x + 4)^2 - 9(y - 3)^2 = 9$?

a. $(4 - \sqrt{10}, -3)$ b. $(-4 + \sqrt{10}, 3)$ c. $(-4 + 2\sqrt{2}, 3)$ d. $(-1, -3)$ e. $(-4, -2)$

3. How many solutions does the system $\begin{cases} 3x - y = 7 \\ 9x - 3y = 21 \end{cases}$

- a. Infinitely Many b. 1 c. 0 d. Insufficient information

4. Find value of y for the solution of $\begin{cases} x - y - z = 1 \\ 2x + 3y + z = 2 \\ 4x + 2y = 0 \end{cases}$

- a. -3 b. 2 c. 6 d. 4.5 e. -10

5. Write out the partial fraction decomposition for $\frac{4x^2+3x-7}{x^2(x+5)(x^2-2x+3)^2}$. Do not solve for coefficients.

a. $\frac{A}{x} + \frac{B}{x^2} + \frac{C}{x+5} + \frac{Dx+E}{x^2-2x+3}$ b. $\frac{A}{x} + \frac{B}{x^2} + \frac{C}{x+5} + \frac{Dx+E}{x^2-2x+3} + \frac{Fx+G}{(x^2-2x+3)^2}$

c. $\frac{A}{x^2} + \frac{B}{x+5} + \frac{Cx+D}{x^2-2x+3} + \frac{Ex+F}{(x^2-2x+3)^2}$ d. $\frac{A}{x} + \frac{B}{x^2} + \frac{C}{x+5} + \frac{Dx+E}{(x^2-2x+3)^2}$

6. If $n(A \cup B) = 50$, $n(A \cap B) = 10$, and $n(B) = 20$, find $n(A)$.

- a. 30 b. 10 c. 20 d. 40

7. Find the sum of $7 + 12 + 17 + \dots + 102$.

- a. 1090 b. 2071 c. 1092 d. 2080 e. None of the above.

8. What is the 18th term of the sequence $\{a_n\} = \left\{\frac{2n-3}{4n}\right\}$

- a. $\frac{1}{2}$ b. $\frac{11}{24}$ c. $\frac{15}{72}$
d. $\frac{11}{12}$ e. $\frac{33}{4}$ f. $\frac{31}{72}$

9. Find the asymptotes of the hyperbola:

$$y^2 - 4y - 4x^2 + 8x = 4$$

- a. $y = \frac{1}{4}x + \frac{9}{4}$
 $y = -\frac{1}{4}x + \frac{7}{4}$ b. $y = 2x$
 $y = -2x + 4$ c. $y = \frac{1}{2}x + \frac{5}{2}$
 $y = -\frac{1}{2}x + \frac{3}{2}$
d. $y = -4x - 2$
 $y = 4x + 6$ e. $y = \sqrt{2}x - 5$
 $y = -\sqrt{2}x + 3$ f. $y = \frac{\sqrt{2}}{4}x - \frac{3}{2}$
 $y = -\frac{\sqrt{2}}{4}x - \frac{1}{2}$

10. Which type of conic section is $2x^2 + 3y^2 - 8x + 6y + 5 = 0$

- a. Circle b. Parabola c. Ellipse d. Hyperbola e. Not a Conic

11. Notice that $7.27272727\dots = 7.2 + 0.072 + 0.00072 + 0.0000072 + \dots$. Use this fact to write $7.27272727\dots$ as the quotient of two integers.

a. $\frac{231}{33}$

b. $\frac{727}{99}$

c. $\frac{81}{11}$

d. $\frac{80}{11}$

e. $\frac{239}{33}$

f. None of the above.

12. Find the sum of the coordinates of the solution of the system of equations:

$$\begin{cases} 2x - 3y = -1 \\ 10x + y = 11 \end{cases}$$

a. $-\frac{23}{28}$

b. 11

c. $-\frac{4}{3}$

d. 0

e. 2

13. The partial fraction decomposition of $\frac{x+1}{x(x-2)}$ is $\frac{A}{x} + \frac{B}{(x-2)}$. Find the value of A.

a. $\frac{3}{4}$

b. $-\frac{7}{6}$

c. $-\frac{1}{2}$

d. $-\frac{3}{4}$

e. $-\frac{1}{6}$

14. Find the number of solutions of the system of equations:

$$\begin{cases} x^2 + y^2 = 4 \\ y = x^2 - 9 \end{cases}$$

a. 4

b. 3

c. 2

d. 1

e. 0

15. Find and simplify the sum of

$$\sum_{k=1}^{25} \left(\frac{2}{3}\right)^k$$

a. $\frac{2}{3} \left(1 - \left(\frac{2}{3}\right)^{25}\right)$

b. $\frac{25}{2} \left(\frac{2}{3} + \left(\frac{2}{3}\right)^{25}\right)$

c. $\frac{1}{1 - \left(\frac{2}{3}\right)^{25}}$

d. $2 \left(1 - \left(\frac{2}{3}\right)^{25}\right)$

e. 3

16. Find the largest x -value that is part of a solution of the system $\begin{cases} x^2 - 4y^2 + 7 = 0 \\ 3x^2 + y^2 = 31 \end{cases}$

- a. $\sqrt{11}$ b. 2 c. $\frac{51}{13}$ d. $\frac{119}{13}$ e. 3

17. Find the sum:

$$\sum_{k=1}^{25} 3k - 7$$

- a. 1775 b. 800 c. 2918 d. 150 e. 1600

18. If $A = \{1, 3, 5, 7, 9\}$, $B = \{1, 5, 6, 7\}$, and $C = \{1, 2, 4, 6, 8, 9\}$, what is $(A \cap B) \cup C$?

- a. $\{1, 2, 3, 4, 5, 6, 7, 8, 9\}$ b. $\{1\}$ c. $\{1, 2, 4, 5, 6, 7, 8, 9\}$
d. $\{3\}$ e. $\{1, 6, 9\}$ f. None of the above

19. Find the 5th term of the series $\{a_n\} = \left\{\left(\frac{2}{3}\right)^n\right\}$

- a. $\frac{64}{729}$ b. $\frac{16}{243}$ c. $\frac{16}{81}$
d. $\frac{32}{729}$ e. $\frac{32}{243}$ f. $\frac{64}{243}$

20. Assume $1^3 + 2^3 + 3^3 + \dots + n^3 = \frac{1}{4}n^2(n+1)^2$ is true for all n . If $(n+1)^3$ and $(n+2)^3$ are added to the left side, what is the new value of the right side.

- a. $\frac{1}{4}(n+1)^2(n+3)^2$ b. $\frac{1}{4}n^2(n+2)^2$ c. $\frac{1}{4}(n+2)^2(n+3)^2$
d. $\frac{1}{4}(n+1)^2(n+3)^2$ e. $\frac{1}{4}(n+1)^2(n+2)^2$ f. Not Enough Information

Key:

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