CONICS/COORDINATE GEOMETRY – THETA
Mu Alpha Theta National Convention 2003

For all questions, E. NOTA means "none of the above" answers is correct.

1. Determine the slope of a line that passes through the points (-1, 6) and (-3, -5).

a. $\frac{11}{2}$ b. $\frac{1}{2}$ c. $\frac{2}{11}$ d. $\frac{-1}{4}$ e. NOTA

2. If the point (x, 3) lies on the graph of $x + 2y = 5$, find the value of x.

a. 5 b. 2 c. 1 d. 0 e. NOTA

3. P(-4, -2) has been plotted on a Cartesian plane. A line is to be drawn through point P so that it never crosses the x-axis. Through which of the following points must the line pass?

a. (4, 2) b. (4, -2) c. (2, 4) d. (2, -4) e. NOTA

4. Which one of the following represents the equation of a line with a slope of 8 that intersects the y-axis at y = -3.

a. $y = 3x - 8$ b. $y = 8x + 3$ c. $y = 8x - 3$ d. $y = 3x + 8$ e. NOTA

5. Find the center of the circle represented by the equation: $x^2 + y^2 - 4x + 6y - 12 = 0$

a. (2, -3) b. (2, 3) c. (-2, 3) d. (-2, -3) e. NOTA

6. Which conic best describes the following: The equation of this conic would be the locus of a point which moves so that it is always equidistant from the point (4, 2) and from the line $x - y = 0$.

a. a circle b. an ellipse c. a hyperbola d. a parabola e. NOTA

7. What is the equation of the line passing through the point (2, 3) and is parallel to the line: $3x - 6y = 12$?

a. $x - 2y = -4$ b. $x + 2y = 8$ c. $2x - y = 1$ d. $-x - 2y = 4$ e. NOTA

8. Line L contains the points (-5, 3) and (-1, 2). Line M is perpendicular to Line L. Find the slope of Line M.

a. -4 b. $\frac{-1}{4}$ c. $\frac{1}{4}$ d. 4 e. NOTA

9. If the graph of y = mx + b has a positive slope and its y-intercept is also positive, then its x-intercept is

a. zero b. negative c. positive d. equal to its y-intercept e. NOTA

10. If the vertex of a parabola is at the point (-4, 3) and whose focus is at the point (-3, 3), then what is the equation of the directrix?

a. y = -3 b. x = -3 c. y = -5 d. x = -5 e. NOTA

11. A company finds its cost function to be c (x) = 100 + 50x and its revenue function to be r (x) = 102x - x^2. In these functions, cost and revenue, are expressed in dollars and x is the number of units produced and marketed. Find the number of units of production that gives the maximum profit.

a. 26 b. 28 c. 32 d. 34 e. NOTA

12. Which one of the following is the ordered pair for the y-intercept for the given equation y – 6 = 7 (x + 4) ?

a. (0, 28) b. (0, 22) c. (0, 4) d. (0, -34) e. NOTA

13. The graph of $x^2 - y^2 - 2x - 4y - 4 = 0$ is the equation of which one of the following?

a. a circle b. an ellipse c. a hyperbola d. a parabola e. NOTA

14. Find the center of the graph stated in #13.

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

15. Find the coordinates of the turning point of the curve $y = x^2 - 8x + 15$

a. (0, -1) b. (2, 0) c. (4, -1) d. (5, 0) e. NOTA

16. Find the equation of the perpendicular bisector of the line segment TL given T(-2, 4) and L (4, -8).

a. x + y = 8 b. x – 2y = 5 c. x + 2y = -3 d. 2x - y = 0 e. NOTA

17. Given the parabola whose equation is $x = 6y^2 + 5y + 3$. What is the equation of its axis of symmetry?

a. $x = \frac{-5}{12}$ b. $x = \frac{47}{24}$ c. $y = \frac{47}{24}$ d. $y = \frac{-5}{12}$ e. NOTA

18. Given the equation of the following ellipse: $9x^2 + 25y^2 - 54x + 50y - 119 = 0$. Two circles are each drawn sharing the same center as the ellipse. Each circle touches the ellipse twice. What is the sum of the radii of these two circles.?

a. 34 b. 24 c. 15 d. 8 e. NOTA

19. The graph of y = -4 lies in which quadrants?

a. I and II only b. I and IV only c. II and III only d. III and IV only e. NOTA

20. Find the center of the circle whose y-intercepts are 6 and -2 and whose center lies on the line x = 2y.

a. (2, 1) b. (4, 2) c. (6, 3) d. (8, 4) e. NOTA

21. A parabolic arch has a span of 20 feet and is 10 feet high at its vertex. What is the height , in feet, of the arch at a distance of five feet from the center.

a. 5 b. 6.25 c. 7.5 d. 8.75 e. NOTA

For Questions #22 – 24, use $64x^2 - 225y^2 - 384x - 900y - 14724 = 0$

22. Let A(a, y) and B(b, y) be the foci of the given hyperbola, determine the sum of a + b.

a. 0 b. 4 c. 6 d. 11 e. NOTA

23. Determine the point of intersection of the asymptotic lines.

a. (-3, 2) b. (0, 0) c. (2, 3) d. (2, 3) e. NOTA

24. What is the length of the conjugate axis?

a. 8 b. 15 c. 16 d. 30 e. NOTA

25. Find the distance from the point (5, -2) to the line $5x - 2y = -16$ is

a. 13 b. 5 c. $\sqrt{13}$ d. 3 e. NOTA

26. What is the area, in square units, of a parallelogram inscribed in the ellipse whose equation is $\frac{x^2}{121} + \frac{y^2}{49} = 1$ if the vertices of the parallelogram are at the ends of the major and minor axes of this ellipse?

a. 38.5 b. 77 c. 154 d. 308 e. NOTA

27. Given the following coordinates that each lie on the circumference of Circle P: (5, 7), (6, 6), (-2, 0). Determine the center of Circle P.

a. (3, 2) b. (2, 3) c. (1, 3) d. (3, 4) e. NOTA

28. Determine the radius of the circle P in Question #27.

a. 5 b. 4 c. $\sqrt{13}$ d. $2\sqrt{3}$ e. NOTA

29. Circle O is represented by the equation $ax^2 + by^2 + cx + dy + e = 0$. Circle O has a center at (10, -1) and it is also externally tangent to the circle whose equation is $x^2 + y^2 + 4x - 8y - 5 = 0$, then what is the radius of circle O?

a. 5 b. 6 c. 7 d. 8 e. NOTA

30. How many of the following is (are) always TRUE?

I. The eccentricity of a circle is 1.
II. The eccentricity of a parabola is greater than 1.
III. The eccentricity of a hyperbola is greater than or equal to one.
IV. The eccentricity of an ellipse is between zero and one, inclusive.

a. 1 b. 2 c. 3 d. 4 e. NOTA

Answer:

1. a	21. c
2. e	22. c
3. b	23. e
4. c	24. c
5. a	25. b
6. d	26. c
7. a	27. b

8. d
9. b
10. d
11. a
12. e
13. c
14. b
15. c
16. b
17. d
18. d
19. d
20. b
28. a
29. d
30. e