

- 12) Let line B have the equation $3x + 5y = 12$ and line C have the equation $x = -1$, find the y-coordinate where lines B and C intersect.
- A) 1 B) 2 C) 3 D) 4 E) not given
- 13) What word or phrase best describes the triangle with vertices at $(0, 0)$, $(5, 0)$, and $(0, 5)$?
- A) Right & Isosceles B) Acute & Scalene C) Right & Scalene D) Acute & Isosceles E) equilateral
- 14) Find the equation of the axis of symmetry of $y = x^2 - 2x + 1$.
- A) $x = 0$ B) $x = 1$ C) $x = 2$ D) $x = -1$ E) not given
- 15) How many times does $x^2 + y^2 = 1$ intersect $y = x^2 - 25$?
- A) 0 B) 1 C) 2 D) 3 E) 4
- 16) Which number is not in the range of $y = -\sqrt{3-x}$?
- A) -3 B) -2 C) 0 D) 1 E) all in range
- 17) The function $f(x) = x^3$ is vertically stretched by a factor of 4 and translated down 10 units. After applying both transformations, the point that was originally at $(2, 8)$ is now where?
- A) $(2, 12)$ B) $(2, 22)$ C) $(8, 12)$ D) $(8, 22)$ E) not given
- 18) Which of the following is a vertical asymptote for $f(x) = \sec\left(\frac{1}{3}x\right)$?
- A) $x = \pi$ B) $x = 2\pi$ C) $x = 3\pi$ D) $x = 4\pi$ E) $x = 5\pi$
- 19) What is the minimum value of $y = 3(x+2)^2 - 17$?
- A) 3 B) -2 C) 2 D) -17 E) not given
- 20) An ellipse has vertices at $(2, 9)$, $(12, 9)$, $(7, 14)$ and $(7, 0)$. Find the length of the major axis.
- A) 2 B) 7 C) 10 D) 14 E) not given
- 21) How many times do the graphs of $y = x$ and $y = \sin(x)$ intersect?
- A) 0 B) 1 C) 2 D) 3 E) not given
- 22) How many unique zeros does the function $f(x) = x^4 + 2x^3 - 399x^2$ have in the interval $[-10, 10]$?
- A) 0 B) 1 C) 2 D) 3 E) 4

For questions 23 – 27, let $y = 3(x-2)^3 - 11$.

23) What word best describes the graph of y ?

- A) Linear B) Quadratic C) Cubic D) Exponential E) Sinusoidal

24) Which of the following points is on the graph?

- A) (1, -14) B) (1, -8) C) (1, -2) D) (1, 4) E) (1, 10)

25) Find the y -intercept of the graph.

- A) (0, -11) B) (0, -2) C) (0, 13) D) (0, -35) E) not given

26) For what value of x does $y = -11$?

- A) 0 B) 1 C) 2 D) 3 E) 4

27) Find the y -coordinate of the point where y intersects the vertical line $x = 7$?

- A) 353 B) 364 C) 375 D) 386 E) not given

28) Which of the following functions does not intersect its inverse relation?

- A) $f(x) = \ln(x)$ B) $f(x) = \sqrt{x}$ C) $f(x) = \sin^{-1}(x)$ D) $f(x) = \frac{8x+7}{3}$ E) $f(x) = x^3$

29) Let $f(x) = 3\sqrt{x-2} - 8$. Compute $f(18)$.

- A) 1 B) 2 C) 3 D) 4 E) not given

30) Let $f(x) = ax + b$, where a and b are integers such that $a < b < 0$. Which of the following statements is/are true?

- I. The function is linear.
- II. The function is decreasing.
- III. $f(1)$ will be positive.

- A) I only B) II only C) III only D) I and II only E) I, II, and III

31) Which of the following equations is a polynomial?

- A) $f(x) = \frac{1}{x}$ B) $f(x) = \sqrt{x}$ C) $f(x) = (x-1)^{\sqrt{25}}$ D) $f(x) = 3^x$ E) $f(x) = x^{-3}$

32) The point (2, 6) is reflected about the x-axis. What is the resulting point?

- A) (2, -6) B) (6, 2) C) (-2, 6) D) (-2, -6) E) (-6, -2)

33) The lines $2x - 3y = 7$ and $4x + By = 9$ are perpendicular. Find B.

- A) 6 B) -6 C) $\frac{3}{2}$ D) $-\frac{3}{2}$ E) not given

For questions 33 – 35, a circle is centered at (-3, 2) and contains the point (3, -6).

34) What is the radius of the circle?

- A) 6 B) 7 C) 8 D) 9 E) 10

35) Which of the following points is also on the circle?

- A) (-11, -4) B) (0, 5) C) (9, -12) D) (11, 6) E) (1, 8)

36) The point (6, M) is located inside the circle. Which of the following is a possible value for M?

- A) -3 B) 3 C) 7 D) 11 E) -7

37) Which of the following functions will not have a vertical asymptote?

- A) $f(x) = \frac{3x^2 - 13x + 4}{x^2 - 9}$ B) $f(x) = \frac{x^2 + 1}{2x^2 - 1}$ C) $f(x) = \frac{3x^2 - 12x}{5x - 20}$
- D) $f(x) = \frac{x}{2x^2 - 7x}$ E) All of these will have vertical asymptotes.

38) Which of the following functions has a removable discontinuity (hole)?

- A) $f(x) = \frac{3x^2 - 13x + 4}{x^2 - 9}$ B) $f(x) = \frac{x^2 + 1}{2x^2 - 1}$ C) $f(x) = \frac{3x^2 - 12x}{5x - 20}$
- D) $f(x) = \frac{x}{2x^2 - 7x}$ E) Both C and D

39) What is the maximum number of turning points that a 5th degree polynomial can have?

- A) 1 B) 2 C) 3 D) 4 E) 5

40) For what value of x does $f(x) = \frac{x^2 - 6x + 7}{x^2 - 3x + 10}$ intersect its horizontal asymptote?

- A) -4 B) -3 C) -2 D) -1 E) 0