PSU MATH RELAYS 2016
Graphing

Problems 1 – 23 are multiple choice. Place the letter of the correct answer in the appropriate space on the answer sheet. Choice (E) "a.n.g." represents "answer not given."

1. Quadrant IV contains the point

(A) (3, -5)   (B) (-3, -5)   (C) (-3, 5)   (D) (3, 5)   (E) a.n.g.

2. Point A is graphed in a quadrant, not on an axis. If the *x*-coordinate and the *y*-coordinate of point A have different signs, then point A must be located in Quadrant ___.

(A) II only   (B) I or III only   (C) IV only   (D) II or IV only   (E) a.n.g.

3. The distance between $(4,-5,0)$ and $(1,-1,-2)$ is

(A) $\sqrt{29}$ (B) $\sqrt{3}$ (C) 7   (D) $3\sqrt{5}$ (E) a.n.g.

4. Graphs of inverse functions are

(A) parallel   (B) intersecting at right angles   (C) mirror images across the line $y = x$

(D) intersecting in at least two points   (E) a.n.g.

5. The slope of every vertical line is

(A) positive   (B) undefined   (C) -1 (D) 0   (E) a.n.g.

6. The *x*-intercept of the line through $(2,-3)$ and $(-3,12)$ is

   (A) -1 (B) 5   (C) 1/3   (D) 1   (E) a.n.g.

7. The domain of $y = \dfrac{x-10}{16-x^2}$ is

(A) $x \neq 10$ (B) $x \neq 4, -4$ (C) $-4 < x < 4$ (D) $x < -4$ or $x > 4$ (E) a.n.g.

8. The vertical asymptote of $f(x) = \dfrac{6x-2}{3-x}$ is

(A) $x = \dfrac{-2}{3}$ (B) $y = -6$ (C) $x = 3$ (D) $y = 6$ (E) a.n.g.

9. An equation of the line through $(2,-1)$ and $(-3,4)$ is

(A) $x + y - 1 = 0$ (B) $y = x + 1$ (C) $y + 1 = \dfrac{1}{5}(x-2)^2$ (D) $y + 1 = -3(x-2)$ (E) a.n.g.

10. The graph of the system of equations $\begin{cases} 2x = y + 7 \\ 5y = 2x + 1 \end{cases}$ consists of two lines which

(A) are parallel   (B) intersect at $x = -1$ (C) intersect at $y = 2$ (D) coincide   (E) a.n.g.

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11. How is the graph of $f(x) = 5(x-2)^2$ obtained from the graph of $g(x) = 5x^2$?

(A) shifted right 2   (B) shifted down 2   (C) shifted left 2   (D) scaled by 5   (E) a.n.g.

12. The set of all points in the plane 4 units from the origin is

(A) $x^2 + y^2 = 16$ (B) $xy = 4$ (C) $y = 4$ (D) $|y| = 4$ (E) a.n.g.

13. Below are graphs of three lines with slopes M_1, M_2, and M_3. Making sure to notice the scales on the axes, order the slopes from smallest to largest.
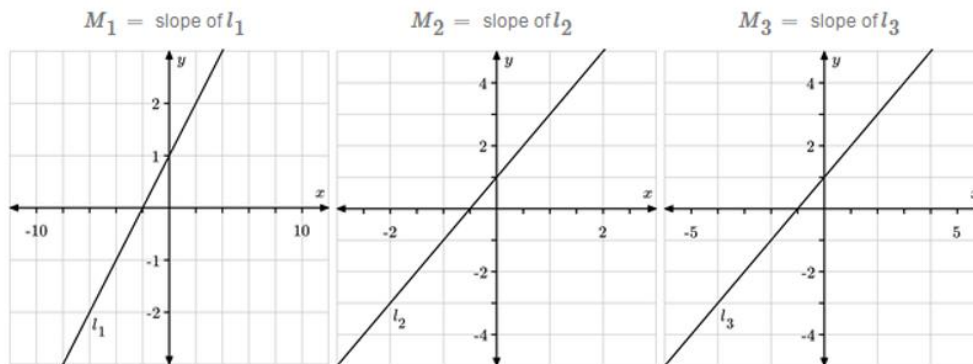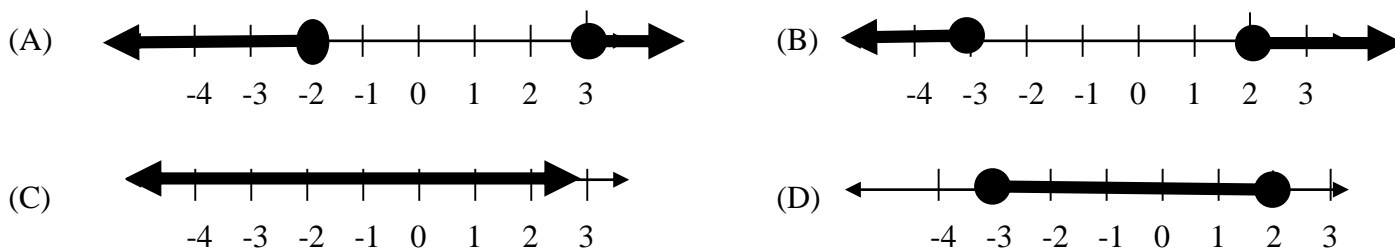

(A) $M_2 = M_3 < M_1$ (B) $M_1 < M_2 = M_3$ (C) $M_2 < M_3 < M_1$ (D) $M_1 < M_3 < M_2$ (E) a.n.g.

14. Which of the following points lies on the curve $y = (1-x)^{2016}$?

(A) (1,1)   (B) (0,1)   (C) (0,-1)   (D) (0, 2016)   (E) a.n.g.

15. The graph of the solution set for $4x + 5 > 1$ is
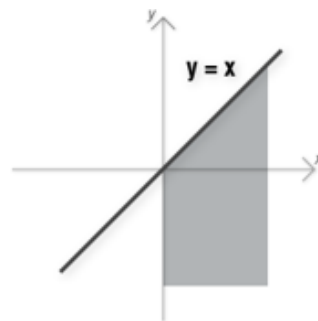
(A)

(B)

(C)

(D)
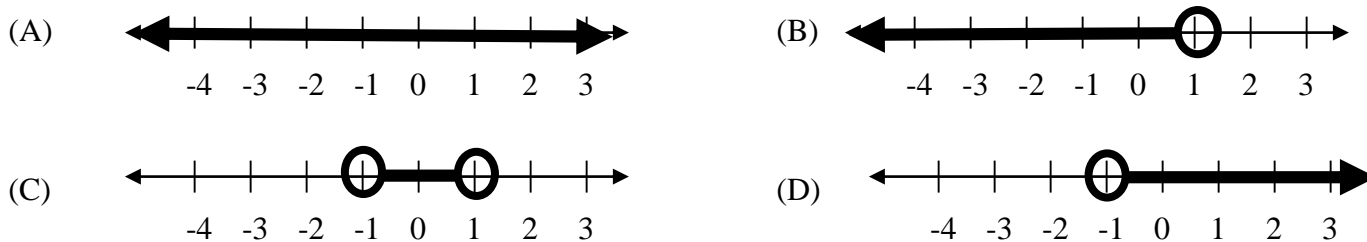
(E) a.n.g.

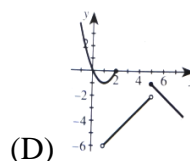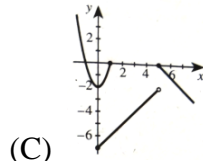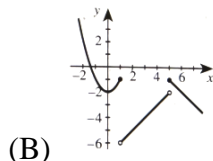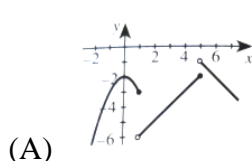16. The graph of the solution set for $x^2 + x \geq 6$ is

(A)

(B)

(C)

(D)

(E) a.n.g.

17. Which of the inequalities best describes the shaded region in the figure.

(A) $x \ge y$ and $x \le 0$ (B) $x \ge y$ and $x \ge 0$ (C) $x \le y$ and $x \ge 0$

(D) $x \le y$ and $x \le 0$ (E) a.n.g.

18. Which of the following is the graph of $f(x) = \begin{cases} -x^2 - 2 & \text{for } x \le 1 \\ x^2 - 7 & \text{for } 1 < x \le 5 \\ 4 - x^2 & \text{for } x > 5 \end{cases}$

(A)   (B)   (C)   (D)   (E) a.n.g.

19. How many x- intercepts does $y = x^2 - 3x + 5$ have?

(A) 3   (B) 2   (C) 1   (D) 0   (E) a.n.g.

20. The graph of the equation defined by $2x^2 - 3 = y^2$ is a

(A) circle   (B) ellipse   (C) hyperbola   (D) parabola   (E) a.n.g.

21. The graphs $y + |x| = 0$ and $y = x^2$ intersect in

(A) 0   (B) 1   (C) 2   (D) 3   (E) a.n.g.

22. The center of $x^2 + y^2 - 8x + 4y - 5 = 0$ is

(A) (4, -2)   (B) (2, 4)   (C) (-8, 4)   (D) $\left(-\dfrac{8}{5}, \dfrac{4}{5}\right)$ (E) a.n.g.

23. If the equation $x^2 + y = 1$ were graphed in the standard coordinate plane, the graph would be a

(A) parabola   (B) hyperbola   (C) ellipse   (D) circle   (E) a.n.g.

24. The slope-intercept form of the equation of the line perpendicular to $2x - 3y = 6$ and passing through (3, -4) is _____?_____.

25. Give the equation in general form $x^2 + y^2 + Ax + By + C = 0$ of a circle with center (4, -2) and radius of 5.

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