PSU MATH RELAYS 2017
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 I contains the point

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

2. Assume we are animating a movie and want to move a game piece from the point $A = (6,2)$ to the point $B = (5,0)$. Where is the game piece when it is 90% of the way along?

(A) $(11,2)$ (B) $(9.9,1.8)$ (C) $(5.1,0.2)$ (D) $(5.5,1)$ (E) a.n.g.

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

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

4. What center should a sphere of radius 5 have so that it sits on top of the point (4,6,-9)?

(A) $(4,-5,0)$ (B) $(4,6,-4)$ (C) $(9,11,-4)$ (D) $(4,6,1)$ (E) a.n.g.

5. The slope of every horizontal line is

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

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

(A) $y = -15x + 27$ (B) $x = -3$ (C) $y = -15x - 1$ (D) $y = -9x + 15$ (E) a.n.g.

7. The domain of $y = \dfrac{x^2 - 20}{\sqrt{16 - x^2}}$ is

(A) $x < -4$ or $x > 4$ (B) $x \neq 5$ (C) $-4 < x < 4$ (D) all real numbers (E) a.n.g.

8. The horizontal 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. Another point on the line determined by $(2,-1)$ and $(-3,4)$ is

(A) (-1,3) (B) (0,0) (C) (10, -9) (D) (-2, 1) (E) a.n.g.

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

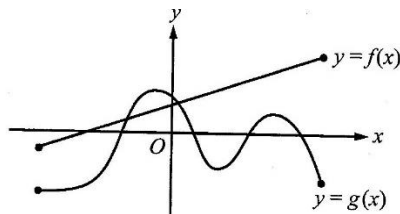(A) are parallel (B) intersect at $x = -1$ (C) intersect at $y = 2$ (D) coincide (E) a.n.g.

11. Which of the following points lies on the curve $y = (1-x)^{2017}$?

(A) (1,1) (B) (0,1) (C) (0,-1) (D) (0, 2017) (E) a.n.g.

12. The set of all points in the plane 4 units from the x-axis is

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

13. The figure below shows the complete graphs of functions f and g. Based on the graphs, how many roots does $f(x) - g(x)$ have?
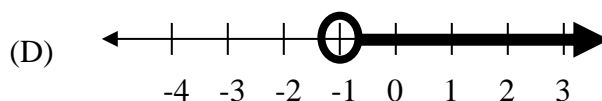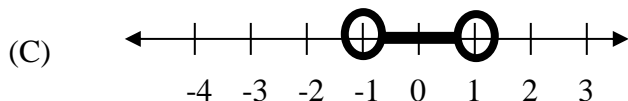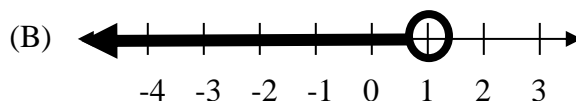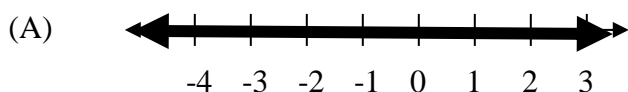

(A) 1 (B) 2 (C) 4 (D) 5 (E) a.n.g.

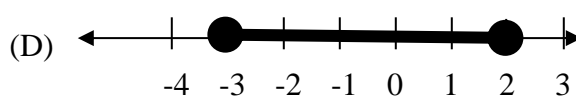14. Based on the graphs above in #13, how many roots does $f(x) \cdot g(x)$ have?
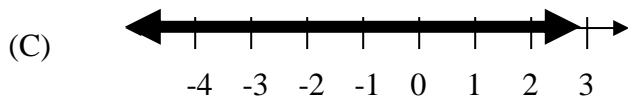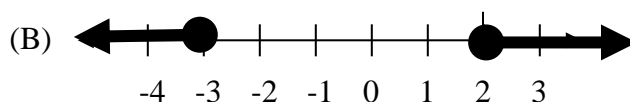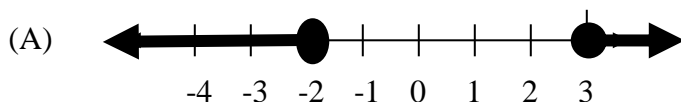
(A) 1 (B) 2 (C) 4 (D) 5 (E) a.n.g.

15. The graph of the solution set for $|x| \geq -1$ is

(A)

(B)

(C)

(D)

(E) a.n.g.

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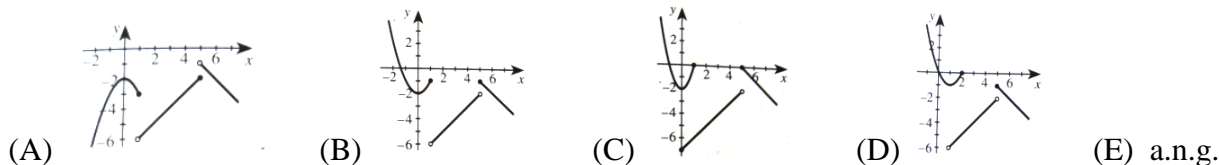
(A)

(B)

(C)

(D)

(E) a.n.g.

17. What is the x-intercept of the graph of $y = \dfrac{1}{8} x^{3/2} - 8$?

(A) 16 (B) 512 (C) $\dfrac{1}{16}$ (D) -4 (E) a.n.g.

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

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

19. How many x-intercepts does $y = x^2 - 2x + 7$ have?

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

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

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

21. The x-coordinate of the point of intersection of the graphs of $13x + 7y = -8$ and $5x = 2y + 11$ is

(A) $-\dfrac{8}{11}$ (B) 2   (C) -3 (D) 1   (E) a.n.g.

22. The center of $2x^2 + y^2 - 16x + 4y + 6 = 0$ 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 $x^2 - y^2 = 1$ 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 $5x - 3y = 4$ 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 (-3, 2) and radius of 4.