PSU MATH RELAYS 2018
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. A point is graphed in a quadrant, not on an axis. If the x and y coordinates have the same sign, then the point must be located in Quadrant _____.

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

2. Assume we are animating a video game and want to move a character from the point $A = (1,2)$ to the point $B = (5,0)$. Where is the character when it is 90% of the way along?

(A) $(6,2)$ (B) $(3.6,1.8)$ (C) $(5.1,0.2)$ (D) $(4.6,0.2)$ (E) a.n.g.

3. If it were possible to graph in 5 dimensions, we would need how many coordinate axes?

(A) 5   (B) 4   (C) 6   (D) 10   (E) a.n.g.

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

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

5. Which of the following pairs could be slopes of perpendicular lines?

(A) $2, \dfrac{-1}{2}$ (B) $2, -2$ (C) $-1, 2$ (D) $2, \dfrac{4}{2}$ (E) a.n.g.

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

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

7. The domain of $y = \dfrac{x-5}{x^2 + 16}$ 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 slanted asymptote of $f(x) = \dfrac{3x^3 - 2x^2 + 5}{x^2 - 1}$ is

(A) $y = 3x - 2$ (B) $y = 3x$ (C) $x = 1$ (D) $y = 3x^3$ (E) a.n.g.

9. An equation of the perpendicular bisector of the segment joining $(2,-3)$ and $(4,5)$ is

(A) $3x + 2y + 9 = 0$ (B) $4x - y - 11 = 0$ (C) $x + 4y - 7 = 0$ (D) $x - 4y + 1 = 0$ (E) a.n.g.

10. The slope of the line $7x + \sqrt{2}\,y = 4$ is

(A) $2\sqrt{2}$
(B) $-\sqrt{2}$
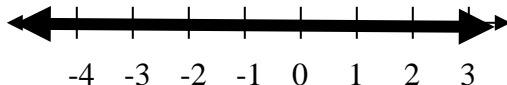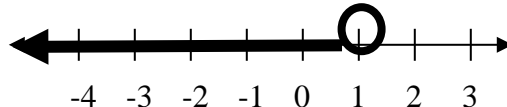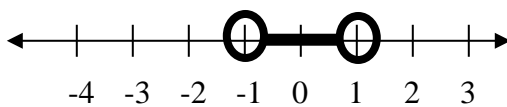(C) $\sqrt{\dfrac{2}{7}}$
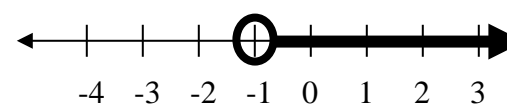(D) $\dfrac{-7}{\sqrt{2}}$
(E) a.n.g.

11. Which of the following points lies on the curve $y = (x+1)^{2018}$?

(A) $(1,1)$
(B) $(0,1)$
(C) $(1,0)$
(D) $(0, 2018)$
(E) a.n.g.

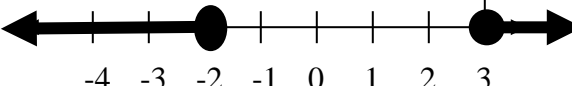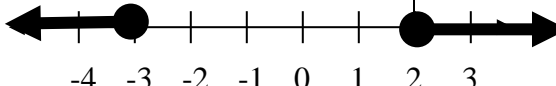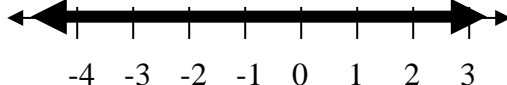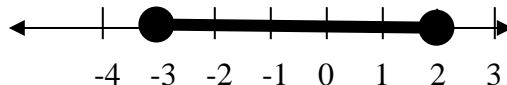12. The set of all points in the plane 4 units from the origin is

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

13. The graph of the solution set for $|x - 3| > -2$ is
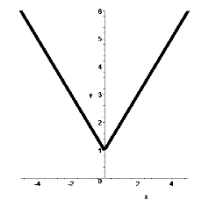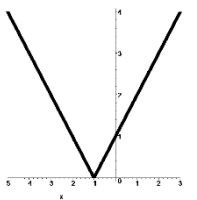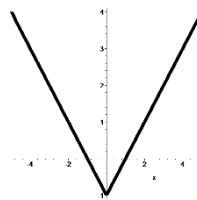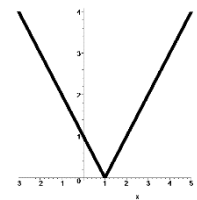
(A)

(B)

(C)

(D)

(E) a.n.g.

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

(A)

(B)

(C)

(D)

(E) a.n.g.

For #15 – 18, write the letter of the graph which matches the given equation.

15. $y = |x| - 1$
16. $y = |x - 1|$
17. $y = |1 - x|$
18. $y - 1 = |x|$

(A)

(B)

(C)

(D)

(E) a.n.g.

19. How many points does it take to determine a circle?

(A) 4   (B) 3   (C) 1   (D) 2   (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 y-coordinate of the point of intersection of the graphs of $-x + 3y = -24$ and $x + y = 8$ is

(A) -8 (B) -4 (C) 12   (D) 0   (E) a.n.g.

22. The vertex of $2x^2 - 12x - y + 13 = 0$ is

(A) $\left(0, \dfrac{17}{2}\right)$ (B) (2, 2)   (C) (3, -5)   (D) $(6, 13)$ (E) a.n.g.

23. If the equation $x^2 = 1 - y^2$ 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 passing through (3,4) and (-2,1) is ____?____.

25. An equation of a parabola which passes through (0,1), (-1,0) and (1,0) is ____?____.