

## Mock Final Exam

Name: \_\_\_\_\_

Date: \_\_\_\_\_

1. Let  $f(x) = 14x^3 + 28x^2 - 46x$  and  $g(x) = 2x + 7$ . Which is the solution set to the equation  $\frac{1}{12}f(x) = g(x)$ ?
 

A. $\{-3, 0, 1\}$	B. $\{-3, -1, 2\}$
C. $\{-2, 1, 3\}$	D. $\{1, 5, 11\}$
  
2. What transformations have occurred to create the function  $f(x) = 3x^3 - 4$  from the function  $g(x) = x^3$ ?
  - A. The graph of the function has been stretched horizontally and shifted up four units.
  - B. The graph of the function has been stretched vertically and shifted up four units.
  - C. The graph of the function has been stretched horizontally and shifted down four units.
  - D. The graph of the function has been stretched vertically and shifted down four units.
  
3. A box with an open top will be constructed from a rectangular piece of cardboard.
  - The piece of cardboard is 8 inches wide and 12 inches long.
  - The box will be constructed by cutting out equal squares of side  $x$  at each corner and then folding up the sides.

What is the entire domain for the function  $V(x)$  that gives the volume of the box as a function of  $x$ ?

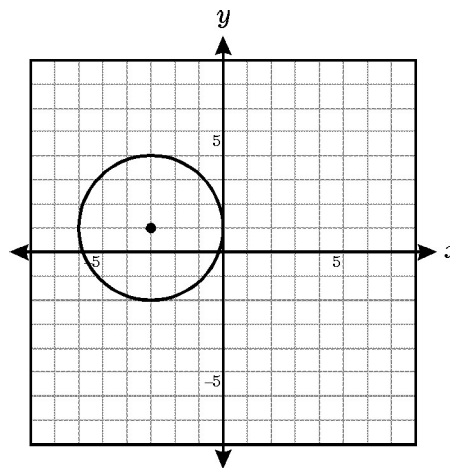
- |                |                 |
|----------------|-----------------|
| A. $0 < x < 4$ | B. $0 < x < 6$  |
| C. $0 < x < 8$ | D. $0 < x < 12$ |

4. Joshua is constructing a triangle with a circle inscribed in it. Each vertex of the triangle will have a line passing through it bisecting the angle. No matter where he places the third vertex, the following conditions will be true:
  - Each line will always bisect its corresponding vertex angle.
  - The three lines will always intersect at the center of the circle.
  - The circle will always be inscribed in the triangle.

Which type of center exists where the three lines intersect?

- |             |                 |
|-------------|-----------------|
| A. centroid | B. circumcenter |
| C. midpoint | D. incenter     |

5. Which of the following is an equation for the circle shown?



- |                                  |                                  |
|----------------------------------|----------------------------------|
| A. $x^2 + y^2 + 6x - 2y + 1 = 0$ | B. $x^2 + y^2 - 6x - 2y + 1 = 0$ |
| C. $x^2 + y^2 + 6x + 2y + 7 = 0$ | D. $x^2 + y^2 - 6x - 2y + 7 = 0$ |

6. What is the inverse function of  $g(x) = x^3 - 2$ ?

A.  $g^{-1}(x) = \sqrt[3]{x+2}$

B.  $g^{-1}(x) = \sqrt[3]{x-2}$

C.  $g^{-1}(x) = \sqrt[3]{x} + 2$

D.  $g^{-1}(x) = \left(\frac{x-2}{3}\right)^3$

7. The function  $y = a(1.20)^t$  models the value of an investment after  $t$  years. Based on the function, what is the approximate monthly interest rate?

A. 8.9%    B. 8.3%    C. 1.5%    D. 1.0%

8. What value of  $x$  satisfies the equation  $\log_3(x-4) = 2$ ?

A. 5    B. 10    C. 12    D. 13

9. A reporter wants to know the percentage of voters in the state who support building a new highway. What is the reporter's population?

- A. the number of people who live in the state
- B. the people who were interviewed in the state
- C. all voters over 25 years old in the state
- D. all eligible voters in the state

10. To completely cover a spherical ball, a ball company uses a total area of 36 square inches of material. What is the maximum volume the ball can have?

(Note: Surface area of a sphere =  $4\pi r^2$ . Volume of a sphere =  $\frac{4}{3}\pi r^3$ .)

- A.  $27\pi$  cubic inches    B.  $36\sqrt{\pi}$  cubic inches
- C.  $\frac{36}{\sqrt{\pi}}$  cubic inches    D.  $\frac{27}{\pi}$  cubic inches

11. A farmer wants to buy between 90 and 100 acres of land.

- He is interested in a rectangular piece of land that is 1,500 yards long and 300 yards wide.
- The piece of land is being sold as one complete unit for \$87,000.

If the farmer does not want to spend more than \$900 an acre, does the land meet all of his requirements? (1 acre  $\approx$  43,560ft<sup>2</sup>)

- A. Yes, the amount of land satisfies his needs, and the price is low enough.
- B. No, the price is low enough, but there is too much land.
- C. No, the price is low enough, but there is not enough land.
- D. No, the amount of land satisfies what he needs, but the price is too high.

12. Which function has a point of discontinuity at  $x = 3$  when graphed?

A.  $f(x) = \begin{cases} 3x + 1; x < 3 \\ x^2 + 1; x \geq 3 \end{cases}$

B.  $f(x) = |x - 3| + 2$

C.  $f(x) = \frac{x-3}{x^2}$

D.  $f(x) = \frac{x+2}{x^2-9}$

13. Which expression is equivalent to  $\frac{x+7}{x^2+4x-21} \div \frac{x+5}{x^2+8x+15}$  when  $x$  is restricted so that the expressions are defined??

A.  $\frac{x+3}{x-3}$     B.  $\frac{x-3}{x+3}$     C. 1    D. -1

14. The diameter of a circle is 8 centimeters. A central angle of the circle intercepts an arc of 12 centimeters. What is the radian measure of the angle?

A.  $\frac{3}{2}$     B. 3    C. 4    D.  $8\pi$

15. A function is shown below.

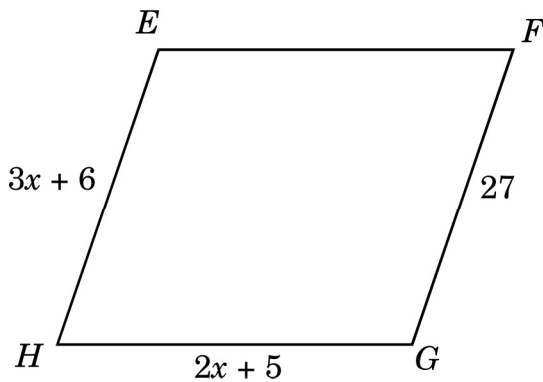
$$f(x) = \begin{cases} -x^2 + 2x & \text{for } x \leq -3 \\ 2\left(\frac{1}{3}\right)^{2x} & \text{for } -3 < x < 4 \\ \frac{2x-5}{x-7} & \text{for } x \geq 4 \end{cases}$$

What is the value of the expression  $f(-3) + 2f(-1) - f(4)$ ?

- A.  $\frac{101}{36}$     B.  $\frac{32}{9}$     C. 4    D. 22
16. What is the solution to the equation:  $\frac{2x-3}{x-1} = \frac{8x+1}{4x+5}$  ?

- A.  $-\frac{14}{5}$     B.  $-\frac{14}{9}$     C.  $\frac{14}{9}$     D.  $\frac{14}{5}$

17. Given parallelogram  $EFGH$ , what is the length of side  $\overline{EF}$ ?

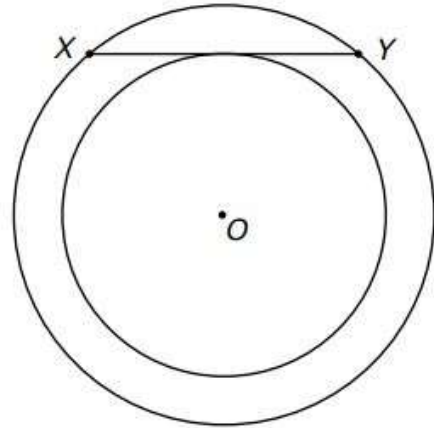


- A. 27    B. 21    C. 19    D. 7

18. The figure below shows concentric circles, both centered at O.

- Chord XY is tangent to the smaller circle.
- The radius of the larger circle is 15 cm.
- The radius of the smaller circle is 12 cm.

What is the length of chord XY?



- A. 27 cm    B. 24 cm  
C. 18 cm    D. 10 cm
19. A container in the shape of a rectangular prism has a base that measures 20 centimeters by 30 centimeters and has a height of 15 centimeters. The container is partially filled with water. A student adds more water to the container and notes that the water level rises 2.5 cm. What is the volume of the added water?
- A. 1,500 cm<sup>3</sup>    B. 3,600 cm<sup>3</sup>  
C. 4,500 cm<sup>3</sup>    D. 9,000 cm<sup>3</sup>
20. What is the approximate length of the arc subtended by an angle of  $\frac{4\pi}{3}$  radians on a circle with a radius of 6.00 meters?
- A. 12.57 meters    B. 14.14 meters  
C. 25.13 meters    D. 28.27 meters