

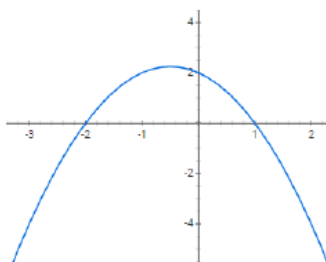
## Topics covered

1. Simplification of algebraic expressions
2. Solving equations and inequalities
3. Working with functions: Graphing functions, composition of functions, the inverse of a function, etc.
4. Familiar families of functions: Lines, parabolas, exponential functions, logarithmic functions, trigonometric functions and basic trigonometric identities.
5. Measurements: area, perimeter, volume, and other quantities

- $(8)^{1/3}(81)^{-1/4} =$ 
  - 6
  - $\frac{3}{2}$
  - $(648)^{-1/12}$
  - $\frac{2}{3}$
- If you know that  $2^{12}$  is approximately 4,000, then which of the following is the best approximation for  $2^{24}$ ?
  - 8,000
  - 16,000
  - $4 \times 10^6$
  - $1.6 \times 10^7$
- If  $\log_4(x + 3) = 2$ , then  $x =$ 
  - 1
  - 13
  - 5
  - 3
- The line  $y = x + 1$  and the parabola  $y = 2x^2$  intersect when  $x = 1$  and when  $x =$ 
  - $\frac{1}{2}$
  - $-\frac{1}{2}$
  - 2
  - 2
- The inequality  $|x - 3| \leq 4$  is equivalent to
  - $x \leq 7$
  - $x \leq -1$
  - $-1 \leq x \leq 7$
  - $-7 \leq x \leq -7$
- Which of the following is a solution of  $\log_2(x + 1) - \log_2(x - 2) = 2$ ?
  - $x = 0$
  - $x = 1$
  - $x = 2$
  - $x = 3$

7. If  $f(x)$  is a function whose graph is shown below, then  $f(x) > 0$  whenever

- (A)  $x > 2$
- (B)  $x > 0$
- (C)  $-2 < x < 1$
- (D)  $x < -2$  or  $x > 1$



8. Which of the following is an equation of a line that passes through the points  $(1, -3)$  and  $(3, 2)$ ?

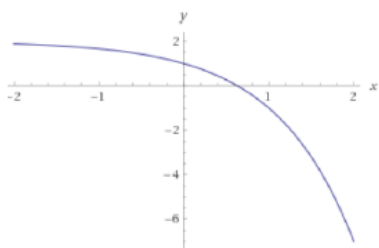
- (A)  $y - 2 = \frac{2}{5}(x - 3)$
- (B)  $y + 2 = \frac{5}{2}(x + 3)$
- (C)  $y - 3 = \frac{2}{5}(x + 1)$
- (D)  $y + 3 = \frac{5}{2}(x - 1)$

9. If  $f(x) = \frac{x^2 - 5}{x + 5}$ , then  $f(a + 2) =$

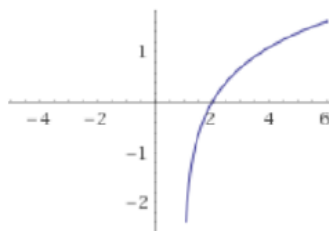
- (A)  $a - 3$
- (B)  $\frac{a^2 + 4a - 1}{a + 7}$
- (C)  $\frac{a^2 - 1}{a + 7}$
- (D)  $-\frac{1}{7}$

10. Which of the graphs below could be a sketch of  $f(x) = -3^x + 2$ ?

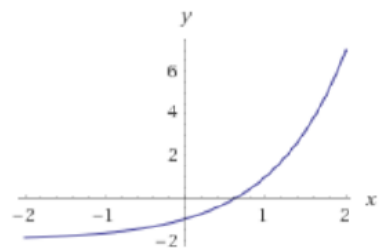
(A)



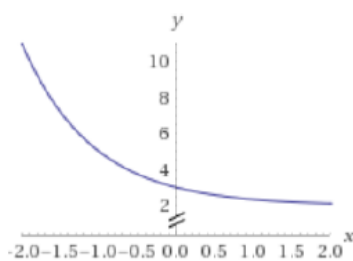
(C)



(B)

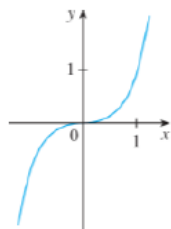


(D)

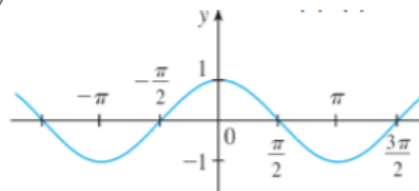


11. A function  $f$  is called even if  $f(-x) = f(x)$ . Which of the functions shown below is even?

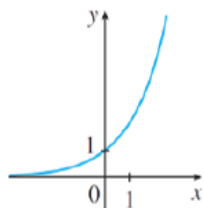
(A)



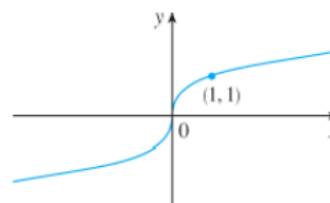
(C)



(B)



(D)



12. The line  $y = 3x - 5$  is perpendicular to

- (A)  $y = -3x - 5$
- (B)  $x + 3y = 6$
- (C)  $4y - 12x = 5$
- (D)  $y = 3x + 2$

13. If  $f(x) = \sqrt[3]{x-1}$ , then the inverse function  $f^{-1}(x) =$

- (A)  $(x-1)^3$
- (B)  $x^3 + 1$
- (C)  $(x-1)^{-1/3}$
- (D)  $x^3 - 1$

14. If  $f(x) = x^2$  and  $g(x) = 3x + 1$ , then the composition  $(f \circ g)(x) =$

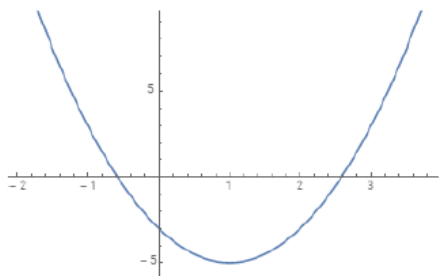
- (A)  $3x^2 + 1$
- (B)  $3x^3 + x^2$
- (C)  $9x^2 + 1$
- (D)  $9x^2 + 6x + 1$

15. A population starts with 100 individuals and doubles in size every 5 years. How many individuals will there be in 25 years?

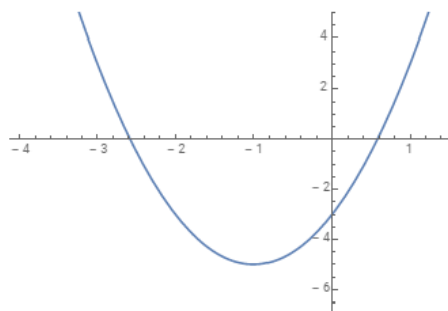
- (A) 3200
- (B) 500
- (C) 2500
- (D)  $100^5$

16. Which of the following graphs represents the graph of  $y = 2x^2 - 4x - 3$ ?

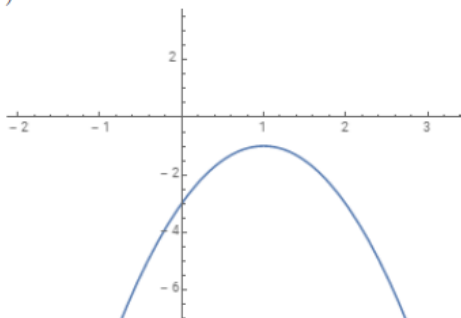
(A)



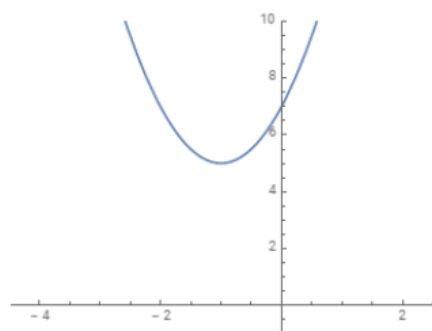
(C)



(B)



(D)



17. If  $f(x) = \cos 3x$ , then  $f(\pi/6) =$

(A) 0

(B)  $\frac{1}{2}$

(C)  $\frac{\sqrt{3}}{2}$

(D) 1

18.  $\sec\left(-\frac{\pi}{3}\right) =$

(A)  $\frac{1}{2}$

(B) 2

(C)  $-\frac{2}{\sqrt{3}}$

(D) -2

19. For which value of  $x$  is  $\tan x$  *not* defined?

(A)  $\pi/4$

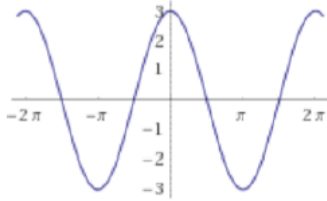
(B)  $\pi$

(C)  $-\pi/2$

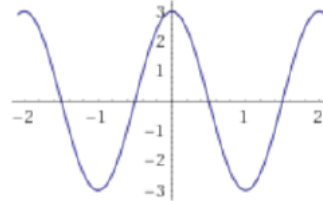
(D)  $\pi/3$

20. Which of the following is a graph of  $y = 3 \cos(\pi x)$ ?

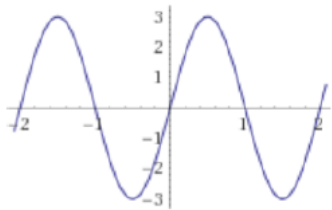
(A)



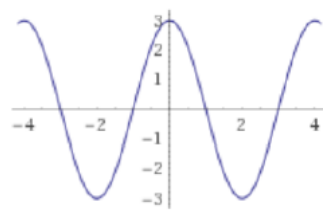
(C)



(B)



(D)



21.  $\sin^2 \theta \cot \theta \sec \theta =$

- (A)  $\sin \theta$
- (B)  $\cos \theta$
- (C)  $\sin \theta \cot \theta$
- (D)  $\sin \theta \cot^2 \theta$

22.  $\cos^2 \theta - 1 =$

- (A)  $\sin \theta$
- (B)  $\cos 2\theta$
- (C)  $\sin^2 \theta$
- (D)  $-\sin^2 \theta$

23.  $\tan^{-1} 1 =$

- (A)  $\pi/4$
- (B)  $\pi/2$
- (C) 0
- (D)  $\pi$

24. If the sides of a cube increase by a factor of 2, then the volume of the cube increases by a factor of

- (A) 2
- (B) 6
- (C) 8
- (D) Not enough information to tell.

## Answers

1. D
2. D
3. B
4. B
5. C
6. D
7. C
8. D
9. B
10. A
11. C
12. B
13. B
14. D
15. A
16. A
17. A
18. B
19. C
20. C
21. A
22. D
23. A
24. C