1. Consider $f(x) = x^2 - 2x + 3$. Is $f(x)$

   (a) Even
   (b) Odd
   (c) Neither
   (d) Both

2. Consider $f(x) = x^2 - 2x + 3$. What is the range of $f(x)$?

   (a) $y = (-\infty, \infty)$
   (b) $y = (2, \infty)$
   (c) $y = [2, \infty)$
   (d) There is no range

3. A model rocket is fired vertically from a platform 10 feet in the air. The rocket's height is given by the function $h(t) = -16t^2 + 80t + 10$ where t is the time in seconds after the rocket is fired. What is the maximum height that the rocket attains?

   (a) 2.5 feet
   (b) 10 feet
   (c) 80 feet
   (d) 110 feet

4. Which of the following equations will shift the quadratic function $y = 3x^2$ up 4 units and left 6 units?

   (a) $y = 3(x - 4)^2 - 6$
   (b) $y = 3(x + 4)^2 - 6$
   (c) $y = 3(x - 6)^2 + 4$
   (d) $y = 3(x + 6)^2 + 4$

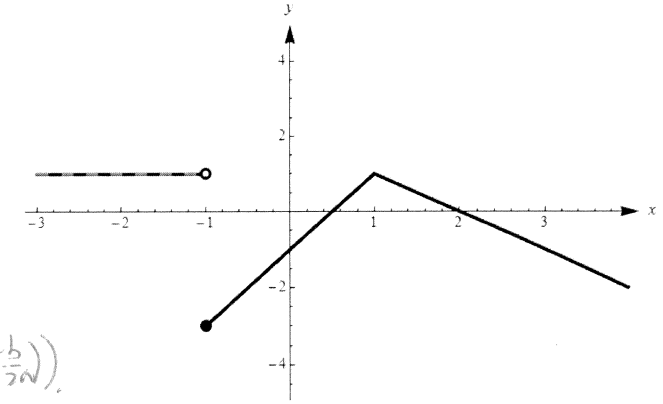
5. Calculate the equation for the inverse of the function, given that $f(x) = 4x + 5$.

   (a) $f^{-1}(x) = \dfrac{1}{4x + 5}$
   (b) $f^{-1}(x) = 5x + 4$
   (c) $f^{-1}(x) = \dfrac{1}{4}x - \dfrac{5}{4}$
   (d) $f^{-1}(x) = \dfrac{1}{4}x - 5$

6. Consider $f(x) = 2x^2 + 3x - 1$ and $g(x) = 3x - 1$. What is $(f \circ g)(2) = ?$

   (a) 18
   (b) 38
   (c) 64
   (d) 65

7. Which is the equation for the following graph?



   (a) $f(x) = \begin{cases} 1, & x < -1 \\ 2x - 1, & -1 \le x \le 1 \\ -x + 2, & x > 1 \end{cases}$

   (b) $f(x) = \begin{cases} 1, & x \le -1 \\ 2x - 1, & -1 < x < 1 \\ -x + 2, & x \ge 1 \end{cases}$

   (c) $f(x) = \begin{cases} -1, & x < -1 \\ 2x - 1, & -1 \le x \le 1 \\ x + 2, & x > 1 \end{cases}$

   (d) $f(x) = \begin{cases} -1, & x < -1 \\ 2x, & -1 \le x \le 1 \\ -x, & x > 1 \end{cases}$

8. Determine the type of the roots for $f(x) = x^4 - 5x^3 + x^2 - 3x + 6$

   (a) Two real roots and two imaginary roots
   (b) Four real roots
   (c) Four imaginary roots
   (d) Three real roots and one imaginary root

9. Given the polynomial $f(x) = x^3 - 4x^2 + x - 4$, which of the following is/are true?

   (a) $f(4) = 0$

   (b) $x - 4$ is a factor of the polynomial

   (c) The polynomial has one real root

   (d) All of the above

10. Factor the following function completely

$$f(x) = 2x^4 + 9x^3 + 5x^2 - 9x - 7$$

   (a) $f(x) = (x-1)(x+1)(x+7)$

   (b) $f(x) = (x-1)(x+1)(2x+7)$

   (c) $f(x) = (x-1)(x+1)^2(x+7)$

   (d) $f(x) = (x-1)(x+1)^2(2x+7)$

11. Which of the following is/are true about the graph of $f(x) = \dfrac{2x-3}{10x^2 - 13x - 3}$?

   (a) The function is continuous

   (b) The function has a removable discontinuity at $x = -\dfrac{1}{5}$

   (c) The function has a hole in the graph at $x = \dfrac{3}{2}$

   (d) All of the above

12. How many asymptotes does $f(x) = \dfrac{3x^3 - 5x^2 - 2x}{2x^3 - 8x}$ have? (Simplify first)

   (a) One

   (b) Two

   (c) Three

   (d) Four

13. Find the slant/horizontal asymptote for the function

$$f(x) = \frac{3x^2 - 4x + 11}{x - 5}$$

   (a) $y = 0$

   (b) $y = 3$

   (c) $y = x - 5$

   (d) $y = 3x + 11$

14. Which of the following could be used to solve the equation $y = \log_b 12$?

   (a) $y = \dfrac{\log b}{\log 12}$

   (b) $y = \dfrac{\log 12}{\log b}$

   (c) $y = b^{12}$

   (d) $b = \dfrac{\log 12}{\log y}$

15. Select the expression equivalent to 3^{x-2}

   (a) $3^x - 9$

   (b) $-9(3^x)$

   (c) $\dfrac{1}{6}(3^x)$

   (d) $\dfrac{1}{9}(3^x)$

16. Select the expression equivalent to $\ln(e^2 \cdot x^3)$

   (a) $2 + 3\ln x$

   (b) $\ln 2 + 3\ln x$

   (c) $5\ln(e \cdot x)$

   (d) $5\ln x$

17. If $f(x) = \sqrt[3]{2x-5}$, find $f^{-1}(x)$.

   (a) $f^{-1}(x) = (2x-5)^3$

   (b) $f^{-1}(x) = (\dfrac{1}{2}x + 5)^3$

   (c) $f^{-1}(x) = (2x)^3 + 5$

   (d) $f^{-1}(x) = \dfrac{1}{2}(x^3 + 5)$

18. What is value of 270° in radians?

   (a) $\dfrac{3\pi}{4}$

   (b) $\dfrac{3\pi}{2}$

   (c) $-\dfrac{3\pi}{2}$

   (d) $\dfrac{\pi}{2}$

19. Which of the following angles is coterminal with angle 225°?

(a) 45°

(b) 135°

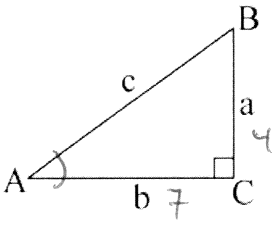
(c) 405°

(d) 585°

+ or − by multiples of 360°.

$225+360 = 585$

20. Find the values of the sine for $\angle A$ if $a = 4$ and $b = 7$.



(a) $\sin\angle A = \frac{4}{11}$

(b) $\sin\angle A = \frac{4\sqrt{65}}{65}$

(c) $\sin\angle A = \frac{7\sqrt{65}}{65}$

(d) $\sin\angle A = \frac{7}{11}$

$a^2+b^2=c^2$

$4^2+7^2=c^2$

$16+49=c^2$

$65=c^2$

$\sqrt{65}=c$

SohCahToa

$\sin\angle A = \frac{o}{h} = \frac{a}{c} = \frac{4}{\sqrt{65}}$

$\frac{4}{\sqrt{65}} \cdot \frac{\sqrt{65}}{\sqrt{65}} = \frac{4\sqrt{65}}{65}$

21. Suppose θ is an angle in standard position whose terminal side lies in Quadrant IV. If $\sin\theta = -\frac{4}{5}$, find the value for $\cot\theta$.

(a) $\frac{3}{4}$

(b) $-\frac{3}{4}$

(c) $\frac{4}{3}$

(d) $-\frac{4}{3}$

SohCahToa

$4^2+b^2=5^2$

$16+b^2=25$

$b^2=9$

$b=3$

$\cot = \frac{1}{\tan}$

$\tan\theta = \frac{4}{3}$

$\cot\theta = 3/4$. since Quad IV, $\cot\theta = -3/4$

22. Find the area of a sector if the central angle of the circle measures 64° and has a radius of 8 cm.

(a) 71.5 cm^2

(b) 35.7 cm^2

(c) 201.1 cm^2

(d) 224.6 cm^2

$A = \frac{1}{2}r^2\theta$ ← radians

$64^\circ \Rightarrow \frac{64}{1} \cdot \frac{\pi}{180}$ 1.12

$A = \frac{1}{2}(8)^2(1.12)$

≈ 35.7

23. A wheel on a school bus has a radius of 42 centimeters. Find the angle (in radians) that the wheel turns while the bus travels 21 meters.

(a) 2

(b) 882

(c) 50

(d) 0.5

24. Which of the following sine functions has an amplitude of 4 and a period of 6π?

(a) $y = 4\sin 3x$

(b) $y = -4\sin 6x$

(c) $y = -4\sin\frac{1}{3}x$

(d) $y = -4\sin\frac{1}{4}x$

$y = a\sin kx$.

amp: $|a| = |4| = 4$. or $|-4| = 4$.

per: $\frac{2\pi}{k}$.

$\frac{2\pi}{k} = \frac{6\pi}{1}$

$6\pi k = 2\pi$

$k = \frac{1}{3}$

$y = 4\sin\frac{1}{3}x$

25. A musical note creates a sound wave modeled by the equation $y = 1.5\cos 140t$, where t is the time in seconds. What is the period of this function?

(a) $\frac{3\pi}{2}$

(b) $\frac{3\pi}{280}$

(c) $\frac{44\pi}{7}$

(d) $\frac{\pi}{70}$

$k = 140$

per: $\frac{2\pi}{k}$

$\frac{2\pi}{140} = \frac{\pi}{70}$

26. Use the graph of the function $y = \sec\theta$ to find the equation of the asymptotes.

(a) $x = \frac{\pi}{2}n$, where n is an even integer

(b) $x = \frac{\pi}{2}n$, where n is an odd integer

(c) $x = \pi n$, where n is an even integer

(d) $x = \pi n$, where n is an odd integer

27. Which of the following are equivalent to $\cos x$? Assume that x is in Quadrant I.

$1-\sin^2 x = \cos^2 x$

Check your identities

I. $\sqrt{1-\sin^2 x}$ true.

II. $\dfrac{\cot x}{\sqrt{1+\cot x}}$

III. $\dfrac{\sqrt{\csc^2 x - 1}}{\csc x} \simeq \dfrac{\csc^2 x - 1}{\csc x} = \dfrac{\frac{1}{\sin x} - 1}{\frac{1}{\sin x}}$

$= \dfrac{1-\sin x}{\sin x} \cdot \dfrac{\sin x}{1} = 1.$

(a) I only

(b) I and II only

(c) I and III only

(d) All of the above

28. Find $\tan x$ if $\dfrac{\csc^2 x - \cot^2 x}{\cot x} = 7$

identity $\Rightarrow \dfrac{1}{\cot x} = 7$

$\Rightarrow \tan x = 7.$

(a) $\frac{1}{7}$

(b) 7

(c) 0

(d) Impossible to determine

29. If $\cos\theta = -\dfrac{3}{5}$ and θ terminates in Quadrant III, find the exact value for $\sin 2\theta$.

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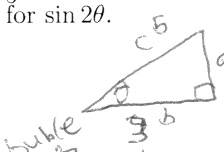


double angle formula.

$3^2 + b^2 = 5^2$ since quad. III.

$b^2 = 16$

$b = 4$ $\sin\theta = -\frac{4}{5}$

$\sin 2\theta = 2\sin x \cos x$

$= 2\left(\frac{-4}{5}\right)\left(\frac{-3}{5}\right)$

$= 24/25$

(a) $-\dfrac{24}{25}$

(b) $\dfrac{24}{25}$

(c) $-\dfrac{8}{5}$

(d) $-\dfrac{6}{5}$

30. Consider the following expression. Is it an identiy?

$$\sin 2x = 2\tan x \cos^2 x$$

$$= 2\frac{\sin x}{\cos x}\cos^2 x = 2\sin x\cos x$$

double angle formula.

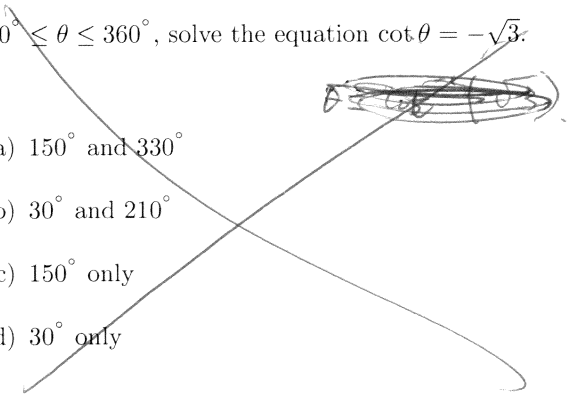
(a) Yes; it is an identity.

(b) No; it is not an identity.

(c) It is an identity only in certain cases.

(d) Not enough information.

31. If $0^\circ \le \theta \le 360^\circ$, solve the equation $\cot\theta = -\sqrt{3}$.



(a) 150° and 330°

(b) 30° and 210°

(c) 150° only

(d) 30° only

32. Find the equation for the inverse of $y = \cos^{-1}(3x)$.

$x = \cos^{-1}(3y)$

$\cos(x) = 3y$

$y = \frac{1}{3}\cos x.$

(a) $\dfrac{1}{3}\cos x = y$

(b) $3\cos x = y$

(c) $\cos(3x) = y$

(d) $\cos(\dfrac{1}{3}x) = y$

33. What is the general solution for $2\sin x + 1 = 0$?

(a) $x = \begin{cases} -\dfrac{\pi}{6} + 2\pi n \\ \dfrac{7\pi}{6} + 2\pi n \end{cases}$

(b) $x = \begin{cases} \dfrac{\pi}{6} + 2\pi n \\ \dfrac{5\pi}{6} + 2\pi n \end{cases}$

(c) $x = \left\{ \pm\dfrac{7\pi}{6} + 2\pi n \right.$

(d) $x = -\dfrac{\pi}{6} + \pi n$