

Work these problems on a separate sheet of paper. Find the x and y intercepts and the domain and range and sketch the graph.

1) $y = 2 - x^2$ 2) $y = (x+2)^2$ 3) $y = \sqrt{x-1}$ 4) $y = \sqrt{9-x^2}$

5) $y = x^3 + 2$ 6) $y = \frac{|x|}{x}$ 7) $y = \sin x, 0 \leq x \leq 2\pi$

8) $y = \cos x, 0 \leq x \leq 2\pi$ 9) $y = \tan x, 0 \leq x \leq 2\pi$

10) $y = \begin{cases} -1, x \leq -1 \\ 3x+2, |x| < 1 \\ 7-2x, x \geq 1 \end{cases}$ 11) $y = \begin{cases} x^2+1, x > 0 \\ -2x+2, x \leq 0 \end{cases}$

Find the asymptotes, symmetry and intercepts and sketch the graph.

12) $y = \frac{1}{x-1}$ 13) $y = \frac{1}{(x+2)^2}$ 14) $y = \frac{2(x^2-9)}{x^2-4}$ 15) $y = \frac{x^2-2x+4}{x-1}$

Solve

16) $x^2 - x - 12 > 0$ 17) $\frac{3x-2}{x+4} \leq 0$ 18) $(x-2)^2(x+1)^3(x-5) \leq 0$ 19) $\frac{(2x+5)(x-1)^2}{(x+2)^3} \geq 0$

20) Find two angles, one positive and one negative, that are coterminal with the given angle.

(a) -35° (b) $\frac{5\pi}{8}$

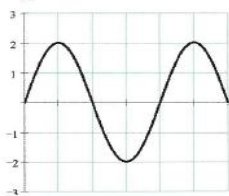
21) Convert 165° to radians. Give your answer in terms of π .

22) Convert $\frac{2\pi}{5}$ to degrees.

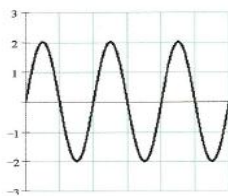
23) Graph $y = \sin\left(\frac{1}{2}x\right) + 1$ One cycle

24. Match the function to the graph.

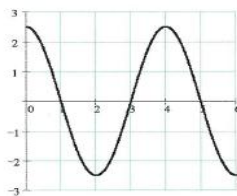
A. $y = 2 \sin 2x$ B. $y = 3 \cos 3x$ C. $y = \frac{3}{2} \cos \frac{x}{2}$ D. $y = -2 \sin \frac{x}{3}$
 E. $y = \frac{1}{2} \sin \pi x$ F. $y = \frac{5}{2} \cos \frac{\pi x}{2}$ G. $y = 2 \sin x$ H. $y = -\cos \frac{2x}{3}$



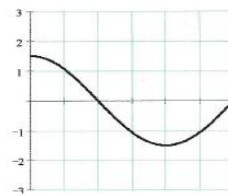
A. _____



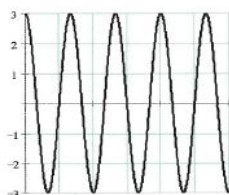
B. _____



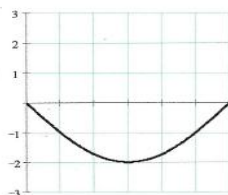
C. _____



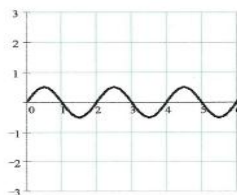
D. _____



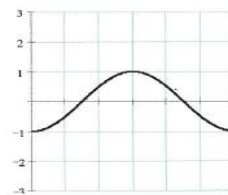
E. _____



F. _____



G. _____



H. _____

25) State the amplitude, period, phase shift and vertical translation of the function and make a sketch of the graph.

A) $y = 2\sin 3(x - \frac{\pi}{6}) + 1$

B) $f(x) = -5\cos(\frac{1}{2} + \pi)$

26) Sketch the graph of a) $y = \arcsin x$

b) $y = \arcsin x$

c) $y = \arctan x$

27) Graph $f(x) = \begin{cases} x+1 & \text{if } x \geq 1 \\ x^2-3 & \text{if } x < 1 \end{cases}$

28) If θ is in the third quadrant and $\cos \theta = -\frac{2}{3}$, draw a figure and find the values of the other five trigonometric functions of θ .

29) Use the following intervals to complete the table below.

A $[-1,1]$ B $(-\infty, \infty)$ C $[0, \pi]$ D $[\frac{-\pi}{2}, \frac{\pi}{2}]$ E $(\frac{-\pi}{2}, \frac{\pi}{2})$

Complete the table with the correct letter for each inverse trig function.

Function	$\sin^{-1} x$	$\cos^{-1} x$	$\tan^{-1} x$
Domain			
Range			

30) Find the exact value of the following.

a) $\sin(\frac{\pi}{6})$

b) $\cos(\frac{5\pi}{4})$

c) $\tan(\frac{5\pi}{3})$

d) $\sin(\frac{3\pi}{2})$

e) $\cos(\pi)$

f) $\tan(\frac{\pi}{2})$

g) $\tan(\frac{-7\pi}{4})$

h) $\cos(\frac{-4\pi}{3})$

i) $\sin(\frac{-11\pi}{6})$

j) $\sin(\frac{\pi}{4})$

k) $\cos(\frac{5\pi}{6})$

l) $\tan(\frac{7\pi}{6})$

m) $\sec(\frac{-5\pi}{4})$

n) $\cot(\frac{5\pi}{6})$

o) $\csc(\frac{4\pi}{3})$

31) Find $\cos \theta$, given $\sin \theta = -\frac{1}{5}$ and $\tan \theta < 0$.

#32 – 38: Multiple choice.

32) All of the following are possible rational roots of $4x^3 + 25x^2 - 3x - 6 = 0$ EXCEPT:

a.) $-\frac{1}{4}$

b.) $\frac{3}{2}$

c.) $\frac{2}{3}$

d.) $\frac{1}{2}$

33) Solve: $x^3 - 3x^2 - 23x + 85 = 0$, given one root is -5 .

a.) $-5, 5, 3$

b.) $-5, -5, -3$

c.) $-5, -4 \pm i$

d.) $-5, 4 \pm i$

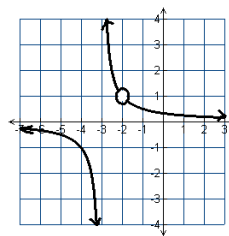
34) Evaluate $f(-3)$, given $f(x) = -4x^3 + 3x^2 + 7x - 4$

- a.) -106 b.) 110 c.) 83 d.) -118

35) Which function could have the graph shown:

a.) $f(x) = \frac{x+2}{x^2+x-6}$ b.) $f(x) = \frac{x+2}{x^2-x-6}$

c.) $f(x) = \frac{x+2}{x^2+5x+6}$ d.) $f(x) = \frac{x-2}{x^2+x-6}$



36) Solve: $\frac{x+2}{x-1} \leq 0$

- a.) $x < -2$ or $x \geq 1$ b.) $x < 1$ c.) $x \geq -2$ d.) $-2 \leq x < 1$

37) Solve: $\frac{(x+1)(x+2)}{x-4} < 0$

- a.) $x \neq 4$ b.) $x < -2$ or $-1 < x < 4$ c.) $-2 < x < -1$ or $x > 4$ d.) $x \neq -1, x \neq -2$

38) Solve: $(x+3)^2(x-4) \geq 0$

- a.) $x = -3$ or $x \geq 4$ b.) $x \geq 4$ c.) $x < -3$ or $-3 < x < 4$ d.) $x \leq 4$

39) If $f(x) = 2x + 3$ and $g(x) = 5x - 1$, find each expression:

- (a) $(f+g)(x)$ (b) $(f \cdot g)(x)$ (c) $g(-2a)$ (d) $f(g(x))$

40) Find the value.

(a) $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$ (b) $\arcsin \frac{\sqrt{3}}{2}$ (c) $\cos(\arctan(-\sqrt{3}))$

41) Find the value.

(a) $\sin\left(\cos^{-1}\frac{3}{5}\right)$ (b) $\tan\left(\sin^{-1}\left(-\frac{8}{17}\right)\right)$ (c) $\sec\left(\arctan\left(-\frac{5}{12}\right)\right)$

42) Given : $f(x) = \sqrt{x+2}$ and $g(x) = x^2 + 1$; find: a) $(f \circ g)(x)$ and the domain b) $(g \circ f)(x)$ and the domain

43) For each function below, find the formula for f^{-1} and state any restrictions on the domain.

a) $f(x) = \sqrt{x+2}$ b) $f(x) = x^3 + 4$ c) $f(x) = x^2 + 6x + 2$

44) Find the domain and range. a) $y = 4\sin 2\left(x - \frac{\pi}{2}\right) + 2$ b) $y = -3\cos \frac{1}{2}(x + \pi) - 1$ c) $y = \frac{1}{2}\tan x + 1$

45) Find the general form for the equations of the asymptotes of and find the range of each.

a) $y = 2\csc 2\left(x + \frac{\pi}{2}\right) - 4$ b) $y = \sec 3(x + \pi)$

46) Graph $f(x) = \begin{cases} \sqrt{x+1} & \text{if } x \geq -1 \\ 2-x^2 & \text{if } x < -1 \end{cases}$

47) Find the domain of the following functions:

(a) $f(x) = 3\sqrt{x-4}$

(b) $y = \frac{x-2}{4x^2-9}$

48) Graph $y = \tan\left(x - \frac{\pi}{4}\right) + 1$

49) Which of the following is equivalent to $\cos(-150^\circ)$?

A. $\cos 150^\circ$

B. $\cos 30^\circ$

C. $\cos(-30^\circ)$

50) Graph $f(x) = \begin{cases} -3-x & \text{if } x \leq 0 \\ 1 & \text{if } 0 < x < 1 \\ x^2 & \text{if } x \geq 1 \end{cases}$

51) Evaluate: $\csc 90^\circ + \cot 0^\circ + \sin 180^\circ + \cos 270^\circ$

52) Determine whether each function below is even, odd, or neither.

a) $g(x) = \sin x + x^3$

b) $h(x) = x^2 - 4$

c) $r(x) = \cos x + x^2$

53) a) If $g(x) = x^2 + 1$ and $f(x) = \sqrt{x+2}$, find $f(g(x))$.

b) $f(x) = 2x + 3$, $g(x) = x^2 - 5x$, find $g(f(x))$.

54) Match the transformations that would create the graph of $g(x)$ from the graph of $f(x)$.

_____ $g(x) = 3f(x)$

A Stretch the graph of $f(x)$ horizontally by a factor of 3.

_____ $g(x) = f(3x)$

B Stretch the graph of $f(x)$ vertically by a factor of 3.

_____ $g(x) = f\left(\frac{1}{3}x\right)$

C shrink the graph of $f(x)$ horizontally by a factor of $\frac{1}{3}$

_____ $g(x) = \frac{1}{3}f(x)$

D Shrink the graph of $f(x)$ vertically by a factor of $\frac{1}{3}$

55. State the type of symmetry: A. $y = x^2 + 1$
 B. $y = x^3 - x$

56. State the domain and range for:

- A. $y = \sin x$ C. $y = |x|$
 B. $y = \cos x$ D. $y = \sec x$

57. State the domain and range for:

- A. $y = \lfloor x \rfloor$ B. $y = 3 \sin 2 \left(x - \frac{\pi}{4} \right) + 1$
 C. $y = -3 \sec 2 \left(x + \frac{\pi}{6} \right) - 1$ D. $y = \cot \frac{1}{3} \left(x + \frac{3\pi}{4} \right)$

- 58) As you ride the Ferris wheel, your distance from the ground varies sinusoidally with time. Let t be the number of seconds that have elapsed since the Ferris wheel started. You find that it takes you 3 seconds to reach the top, 43 ft. above the ground, and that the wheel makes a revolution once every 8 seconds. The diameter of the wheel is 40 ft.
 (a) Sketch a graph of a complete cycle.
 (b) Write an equation for this sinusoid.
 (c) Use your calculator to find your height above the ground when $t = 4\frac{1}{3}$ seconds.
 (d) Use your calculator to find the value of t the second time you are 18 ft above the ground.

59 If $\sec \theta > 0$ and $\cot \theta < 0$, in which quadrant would you find θ ?

60) Find the value of $\cos \theta$ if $\sin \theta = -\frac{2}{3}$ and θ is in standard position with its terminal side in the fourth quadrant.

51) Express $84^\circ 20' 40''$ in decimal degrees.

62) Express 38.405° in degrees, minutes, and seconds.

63) At Ocean Tide dock the first low tide of the day occurs at midnight, when the depth of the water is 2 meters, and the first high tide occurs at 6:00 AM with a depth of 8 meters. Sketch and label a graph showing the depth of the water at the dock as a function of time. Write an equation. Suppose the tanker requiring at least 3 meters of water is planning to dock after midnight. Determine the earliest possible time that the tanker can dock.

64) Complete the following chart using $s = r\theta$

RADIUS	ANGLE	ARC LENGTH
6 inches	$\frac{\pi}{4}$	
	$\frac{5\pi}{6}$	15π feet
10 meters		30 meters

65) Graph the following transformations and give the domain and range.

a) $y = 2x^2 - 4$

b) $y = |x - 2| + 1$

c) $y = 2\sqrt{x}$

d) $y = \frac{1}{2}x^3 - 2$

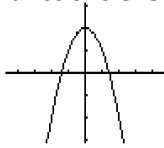
e) $y = \sin(x + \pi)$

f) $y = 2\cos x - 1$

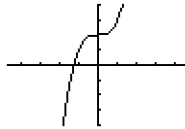
g) $f(x) = \begin{cases} x^2, & x < 0 \\ \sqrt{x} + 1, & x \geq 0 \end{cases}$

66) Are these functions even, odd or neither?

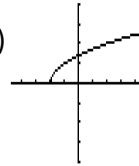
a)



b)



c)



67) Given: $f(x) = \begin{cases} 2x - 1; & x < 2 \\ \sqrt{x - 2}; & x \geq 2 \end{cases}$

find: a) $f(4)$

b) $f(0)$,

c) $f(2)$

68) Find the quadrant the terminal side of the given angle is in.

a) rotation $\frac{2}{5}$ from standard position clockwise.

b) rotation 175° from standard position counterclockwise

69) Given $\tan \theta = \frac{4}{3}$ and the terminal side is in the 3rd quadrant, find the other five trig functions.

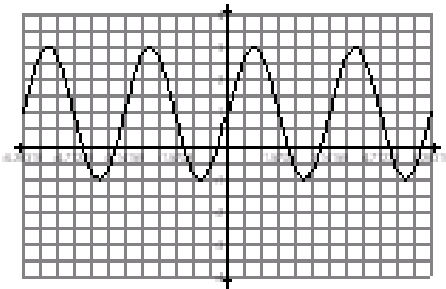
70) Name the quadrant in which θ lies if:

a) $\tan \theta > 0$ and $\cos \theta < 0$

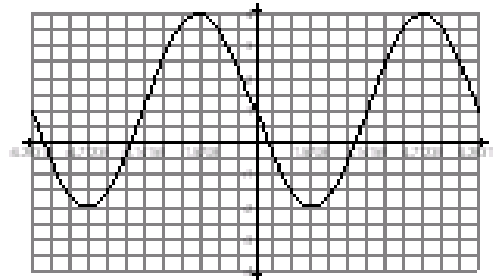
b) $\sin \theta > 0$ and $\sec \theta > 0$

71) Write an equation for the following graphs.

a)



b)



72) If $y = \frac{x+4}{x-2}$, find $f^{-1}(x)$

73) A wheel of radius 12 cm turns at 7 revolutions per second. Find the linear velocity of a point on the edge of the wheel is meters per second.

74) A gear makes 6.2 rotations about its axis, what is the angular displacement in radians of a point on the gear?

75) What is the angular velocity in radians per minutes of a notch on a wheel that makes 24 rotations per second about its axis?

76) The minute hand of a watch is 1.3 cm long. What is the linear velocity of the tip of the hand?

77) What is the smaller angle formed by the hands of a clock at 4:47?

78) Solve the following equations...

a. $x^2 - 6x + 73 = 0$

b. $x^3 - 5x^2 + 2x + 8 = 0$

c. $7x^4 + 37x^3 + 47x^2 - 13x - 30 = 0$

Match the given graph to its equation.

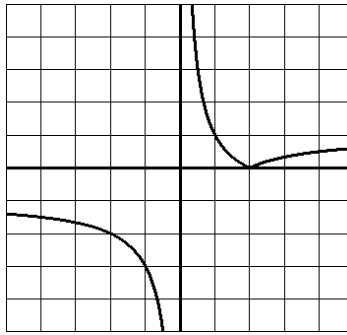
_____ 79) $y = \frac{2(x+3)}{(x-3)^2(x+1)}$

_____ 80) $y = \frac{-4}{x^2+3}$

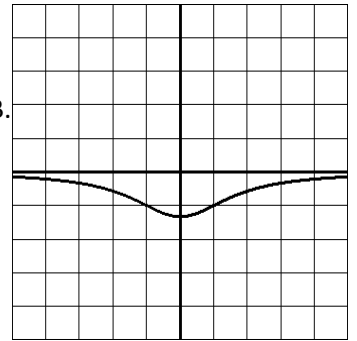
_____ 81) $y = \frac{4x}{\sqrt{16x^2+1}}$

_____ 82) $y = \frac{|x-2|}{x}$

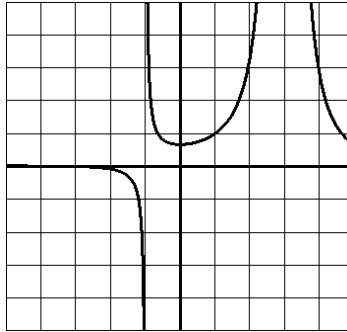
A.



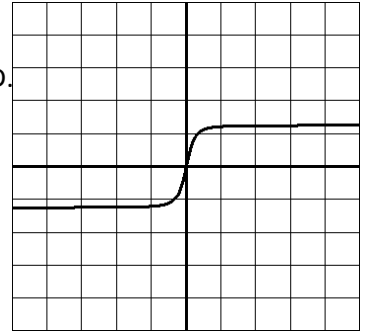
B.



C.



D.



Decompose each of the following into partial fractions.

83) $\frac{x}{x^2 - 5x + 6}$

84) $\frac{5x^2 - x + 27}{(x^3 + 9x)}$