Trigonometry Test 2 Practice
Chapter 3

NON-CALCULATOR PORTION

Given the functions:

1. $y = \sin x$ 2. $y = \cos x$ 3. $y = \tan x$
4. $y = \csc x$ 5. $y = \sec x$ 6. $y = \cot x$

a) Find the domain of each function.
b) Find the range of each function.
c) Graph each function from $-2\pi \leq x \leq 2\pi$. Be sure to label your graph.

7. Consider the following equation $y = -6 - 4\cos\left(7\pi x + \frac{\pi}{3}\right)$. Identify the following:
   a) maximum b) minimum

8. Consider the following equation $y = 7 + 4\cos\left(8\pi x + \frac{\pi}{3}\right)$. Identify the following:
   a) maximum b) minimum

9. Use the fundamental identities to find the **exact** value of the remaining trigonometric functions of *x*, given that $\sec x = \frac{-5}{2}$ and $\sin x < 0$.

10. Use the fundamental identities to find the **exact** value of the remaining trigonometric functions of *x*, given that $\csc x = -2$ and $\cos x > 0$.

11. The voltage E in an electrical circuit is given by $E = 6.3\cos(150\pi t)$, where t is time measured in seconds., Find the amplitude.

Find the amplitude, period, and phase shift, and vertical translation of the following:

12. $y = 5\sin\left(3x + \frac{\pi}{4}\right)$
13. $y = 3\cos\left(3x + \frac{\pi}{2}\right)$
14. $y = 4 - 2\sin\left(4x + \frac{\pi}{6}\right)$
15. $y = -5 - 3\sin\left(6x - \frac{\pi}{2}\right)$

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CALCULATOR PORTION

Given the functions:

16) $y = -3 - 5\,sin\left(\frac{x}{2} + \frac{\pi}{2}\right)$ 17) $y = cot\left(2x + \frac{\pi}{2}\right)$

18) $y = \sin(2x + \pi) + 3$ 19) $y = 2\tan(x)$

a) Find the amplitude of each function.
b) Find the period of each function.
c) Find the phase shift of each function.
d) Find the vertical translation of each function.
e) Find the domain of each function.
f) Find the range of each function.
g) Identify any asymptotes, if any.
h) Sketch the graph of each function over a one-period interval. Be sure to label your graph.

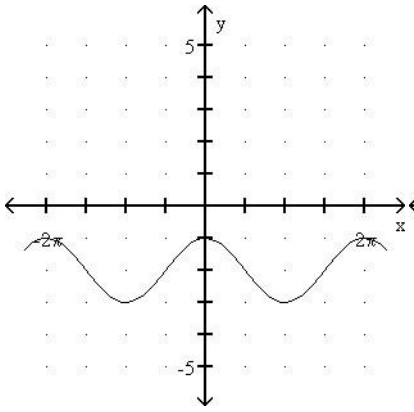
Find the equation for the curve in its final position.

20. The graph $y = \sin(x)$ is shifted a distance of $\frac{\pi}{12}$ to the right, stretched by a factor of 7, translated 2 units downward, then reflected in the x-axis.

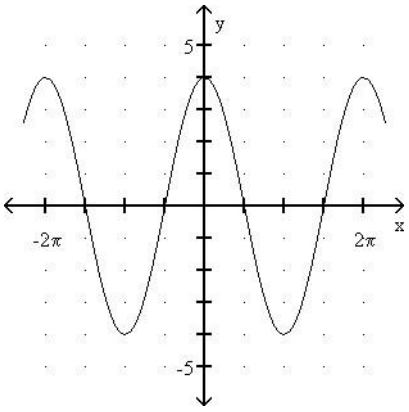
21. The graph of $y = \tan(x)$ is shifted a distance of $\frac{\pi}{6}$ to the right, stretched by a factor of 2, translated 3 units upward, then reflected in the x-axis.

Determine the equation of the function that is graphed.

22.



23.



Graph the function on the given interval, then write an equation in the form $y = Asin(Bx + C)$

24. $y = \sin(x) - 3\cos(x)$, $0 \le x \le 2\pi$

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Solve the Problems.

25. The motion of a spring-mass system is described by the equation $y = 11sin\left(\pi t - \frac{\pi}{2}\right)$, where y is the distance in feet from the equilibrium position and t is time in seconds. If the weight is 18 feet from the ceiling in a state of equilibrium, find the closest the weight will ever be to the ceiling.

26. The motion of a spring-mass system is described by the equation $y = 12sin\left(\pi t - \frac{\pi}{4}\right)$, where y is the distance in feet from the equilibrium position and t is time in seconds. If the weight is 21 feet from the ceiling in a state of equilibrium, find the distance from the ceiling at time $t = 2$.

27. Sales of snow shovels are seasonal. Suppose the sale of snow shovels in Maine is approximated by $s(t) = 10{,}000 - 10{,}000cos\left(\frac{\pi}{6}t\right)$, where t is time in months and $t = 0$ is October. What are the sales in December?

28. An alternating current generator produces a current given by $I = -30sin\left(130\pi t - \frac{\pi}{2}\right)$, where t is time in seconds and I is in amperes.
a) Find the amplitude, frequency, and phase shift.
b) What is the maximum current it produces?

29. An alternating current generator produces a current given by $I = -20cos\left(90\pi t - \frac{\pi}{2}\right)$, where t is time in seconds and I is in amperes. Graph this equation on a calculator for $0 \le t \le 0.1$. How many full periods are shown in the graph?

30. Simplify the following trigonometric functions using identities.

a) $\sin(x + 2\pi)\sec(x)$
b) $\tan(x)\cot(x)$
c) $\tan(x)\sin(x) + \cos(x)$
d) $\frac{\cos(x)}{1 - sin^2(x)}$

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Answers:

1. a) All reals b) $[-1,1]$ c) Check Graphs Using Your Calculator
2. a) All reals b) $[-1, 1]$
3. a) $x \in \mathbb{R}\ excluding\ \left(\frac{\pi}{2} + k\pi\right), k\ is\ an\ integer$ b) All reals
4. a) $x \in \mathbb{R}\ excluding\ (k\pi), k\ is\ an\ integer$ b) $(-\infty, -1] \cup [1, \infty)$
5. a) $x \in \mathbb{R}\ excluding\ \left(\frac{\pi}{2} + k\pi\right), k\ is\ an\ integer$ b) $(-\infty, -1] \cup [1, \infty)$
6. a) $x \in \mathbb{R}\ excluding\ (k\pi), k\ is\ an\ integer$ b) All reals
7. a) -2 b) -10
8. a) 11 b) 3
9. $sinx = \frac{-\sqrt{21}}{5}, cosx = \frac{-2}{5}, tanx = \frac{\sqrt{21}}{2}, cscx = \frac{-5}{\sqrt{21}}, cotx = \frac{2}{\sqrt{21}}$
10. $sinx = \frac{-1}{2}, cosx = \frac{\sqrt{3}}{2}, tanx = \frac{-1}{\sqrt{3}}, secx = \frac{2}{\sqrt{3}}, cotx = -\sqrt{3}$
11. 6.3
12. $amp = 5, per = \frac{2\pi}{3}, horizontal\ shift = \frac{-\pi}{12}$
13. $amp = 3, per = \frac{2\pi}{3}, horizontal\ shift = \frac{-\pi}{6}$
14. $amp = 2, per = \frac{\pi}{2}, horizontal\ shift = \frac{-\pi}{24}, vertical\ translation = up\ 4$
15. $amp = 3, per = \frac{\pi}{3}, horizontal\ shift = \frac{\pi}{12}, vertical\ translation = down\ 5$
16. a) 5 b) 4π c) $-\pi$ d) -3 e) $All\ reals$ f) $[-8,2]$ g) none
17. a) none b) $\frac{\pi}{2}$ c) $\frac{-\pi}{4}$ d) none e) All reals except $\frac{\pi}{4} + \frac{k\pi}{2}$ f) $All\ reals$ g) $\frac{\pi}{4} + \frac{k\pi}{2}$
18. a) 1 b) π c) $\frac{-\pi}{2}$ d) $+3$ e) $All\ reals$ f) $[2,4]$ g) none
19. a) 2 b) π c) none d) none e) All reals except $\frac{\pi}{2} + k\pi$ f) $All\ reals$ g) $\frac{\pi}{2} + k\pi$
20. $y = -7sin\left(x - \frac{\pi}{12}\right) - 2$
21. $y = -2tan\left(x - \frac{\pi}{6}\right) + 3$
22. $y = \cos(x) - 2$
23. $y = 4\cos(x)$
24. $y = 3.162\sin(x - 1.249)$
25. $7\ ft$
26. $29\ ft$
27. 5,000
28. a) amplitude = 30, frequency = 65, $phase\ shift = \frac{1}{260}$ b) 30 amperes
29. 4
30. a) $\tan(x)$ b) 1 c) $\sec(x)$ d) $\sec(x)$