Math 144 Analytic Trigonometry **Name___________________________**

Problem Set #2

Match each function with its graph.

____ **1.** $y = 1 + \sin x$

____ **2.** $y = -\sin x$

____ **3.** $y = \sin 2x$

____ **4.** $y = 2\cos x$

____ **5.** $y = -\csc x$

____ **6.** $y = \sin\left(x - \frac{\pi}{4}\right)$

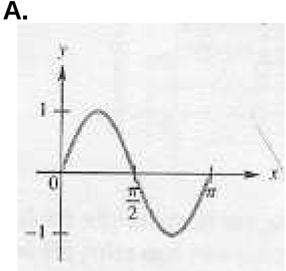
____ **7.** $y = -\tan\left(x - \frac{3\pi}{4}\right)$

____ **8.** $y = -\cot x$

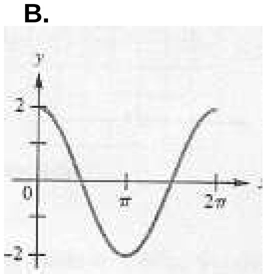
____ **9.** $y = \tan\left(x - \frac{\pi}{4}\right)$

____ **10.** $y = -\sec x$

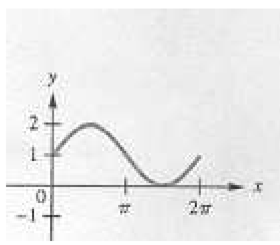
A.



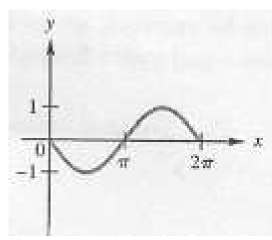
B.



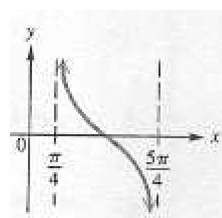
C.



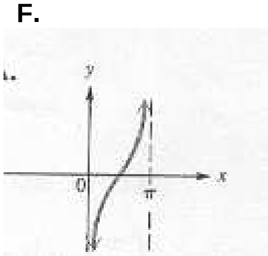
D.



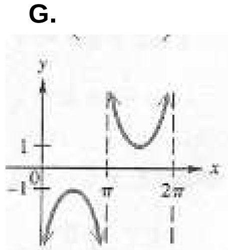
E.



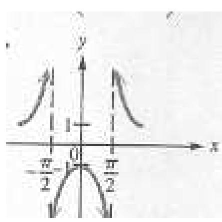
F.



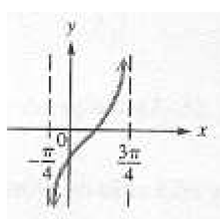
G.



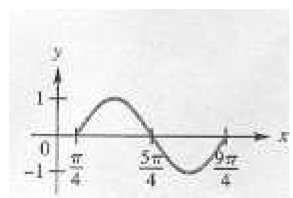
H.



I.



J.



K. None

True-False

____ 11. The smallest positive number k for which $x - k$ is an asymptote for the tangent function is $\frac{\pi}{2}$.

____ 12. The smallest positive number k for which $x - k$ is an asymptote for the cotangent function is $\frac{\pi}{2}$.

____ 13. The tangent and secant functions are undefined at the same values.

____ 14. The secant and cosecant functions are undefined at the same values.

____ 15. The graph of $y = \tan x$ suggests that $\tan x$ is an even function.

____ 16. The graph of $y = \sec x$ suggests that $\sec x$ is an odd function.

Match each function in the first column to the appropriate description in the second column.

Function	Description
____ 17. $y = 3\sin(2x - 4)$	A. amplitude $= 2$, period $= \frac{\pi}{2}$, phase shift $= \frac{3}{4}$
____ 18. $y = 2\sin(3x - 4)$	B. amplitude $= 3$, period $= \pi$, phase shift $= 2$
____ 19. $y = 4\sin(3x - 2)$	C. amplitude $= 4$, period $= \frac{2\pi}{3}$, phase shift $= \frac{2}{3}$
____ 20. $y = 2\sin(4x - 3)$	D. amplitude $= 2$, period $= \frac{2\pi}{3}$, phase shift $= \frac{4}{3}$

Graph the following. Find the period, amplitude, vertical shift, and phase shift where appropriate. Sketch and label the graph.

$$y = 2 + \frac{1}{4}\sec\left(\frac{1}{2}x - \pi\right)$$

Period $=$

21. **Amplitude** $=$

Vertical Shift $=$

Phase Shift $=$

$$y = \tan(2x - \pi)$$

Period $=$

22. **Amplitude** $=$

Vertical Shift $=$

Phase Shift $=$

$$y = -\frac{5}{2} + \cos 3\left(x - \frac{\pi}{6}\right)$$

Period $=$

23. **Amplitude** $=$

Vertical Shift $=$

Phase Shift $=$

$$y = -3 + 3\sin\left(\frac{1}{2}x\right)$$

Period $=$

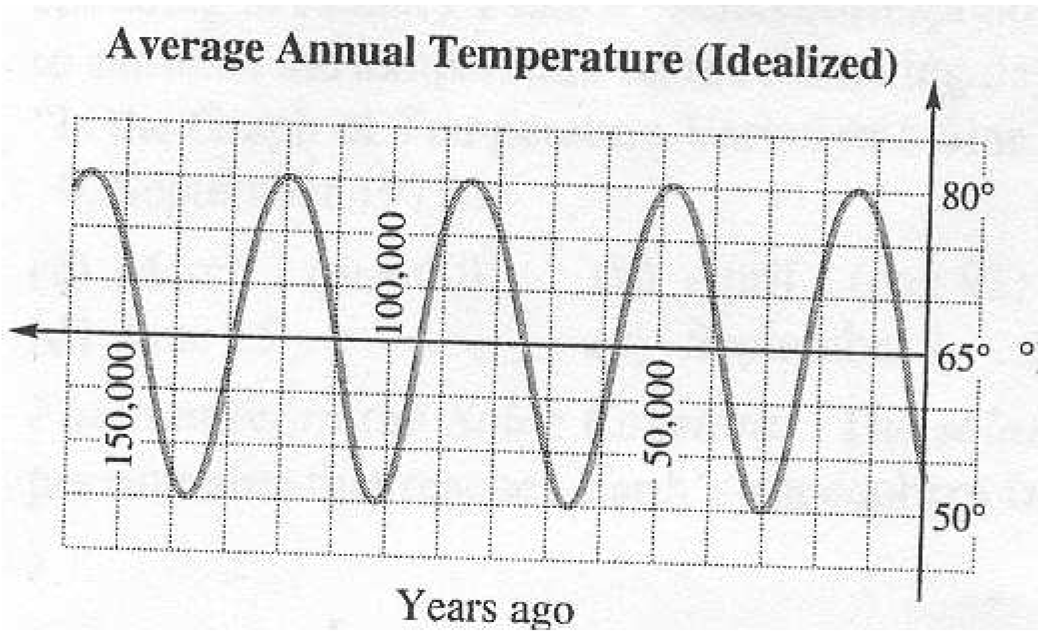
24. **Amplitude** $=$

Vertical Shift $=$

Phase Shift $=$

Solve the following word problems

25. **Scientists believe that the average annual temperature in a given location is periodic. The average temperature at a given location during a given season fluctuates as time goes by, from colder to warmer, and back to colder. The graph shows an idealized description of the average temperature (in degrees °F) for the last few thousand years of a location at the same latitude as Anchorage, Alaska.**



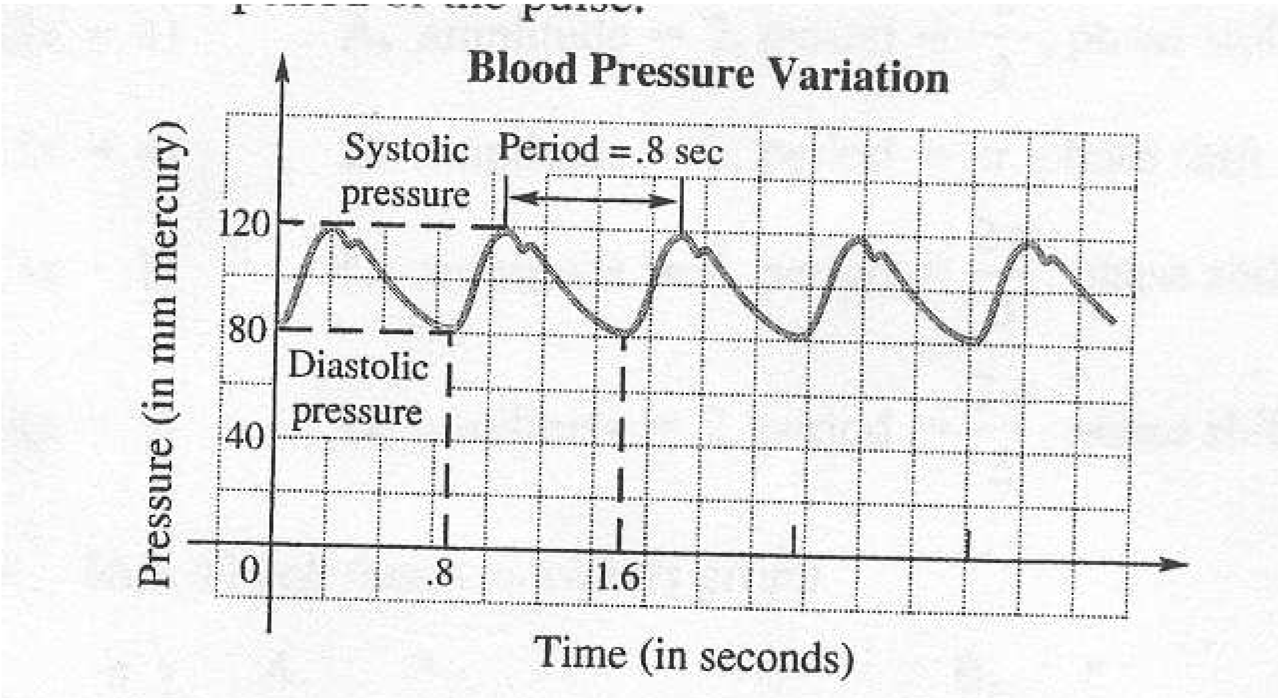
a) Find the highest and lowest average temperatures recorded.

b) Use these two numbers to find the amplitude.

c) Find the period of the function.

d) What is the trend of the average temperature now?

26. The graph gives the variation in blood pressure for a typical person. Systolic and diastolic pressures are the upper and lower limits of the periodic changes in pressure that produce the pulse. The length of time between peaks is called the period of the pulse.



a) Find the amplitude of the graph.

b) Find the pulse rate (the number of beats per minute) for this person.

27. **The average monthly temperature (in °F) in Vancouver, Canada is shown in the table.**

Month	°F	Month	°F
Jan	36	July	64
Feb	39	Aug	63
Mar	43	Sept	57
Apr	48	Oct	50
May	55	Nov	43
June	59	Dec	39

Source: Miller, A. and J. Thompson, *Elements of Meteorology, 4th Edition,* Charles E. Merrill Publishing Co., 1983.

a) Plot the average monthly temperature over a two-year period letting $x = 1$ correspond to the month of January during the first year. Does the data seeem to indicate a translated sine graph?

b) The highest average monthly temperature is 64° in July, and the lowest average monthly temperature is 36° in January. Their average is 50°. Graph the data together with the line $y = 50$. What does this line represent with regard to temperature in Vancouver?

c) Approximate the amplitude, period, and phase shift of the translated sine wave.

d) Determine a function of the form $f(x) = a\sin b(x - d) + c$, where $a, b.c,$ and d are constants that model the data.

e) Graph $f(x)$ together with the data on the same coordinate axes. How well does $f(x)$ model the given data?

28. **A buoy marking a channel in the harbor bobs up and down as the waves move past. Suppose the buoy moves a total of 6 feet from its high point to its low point and returns to its high point every 10 seconds. Assuming that at t = 0 the buoy is at its high point and the middle height of the buoy's path is d = 0, write an equation to describe its motion and sketch a graph that illustrates it.**

29. **A weight on a spring bounces a maximum of 8 inches above and below its equilibrium (zero) point. The time for one complete cycle is 2 seconds. Write an equation to describe the motion of this weight, assume the weight is at equilibrium when t = 0.**