Math 142   Exam 1   Name_____
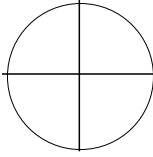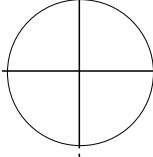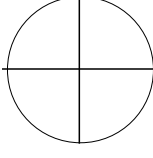1/16/18   [/50]

Show all your work for full credit. Unsupported answers = reduced points. Write neat and clearly and with a pencil please.

1)   Use the unit circle to find the **exact** trig value of each number. Locate the number on the unit circle.

a. $\sin\left(\frac{5\pi}{6}\right)$ _____[/2]

b. $\cos\left(\frac{-3\pi}{4}\right)$ _____[/2]

c. $\csc\left(\frac{7\pi}{3}\right)$ _____[/2]

d. $\cot\left(-\frac{\pi}{2}\right)$ _____[/2]

_____

2)   Use the unit circle to approximate the value of each expression to two decimal places. **DO NOT USE YOUR CALCULATOR. Show each number (a, b, c, d) on the circle.**

a. cos(1.3)   _____[/2]

b. sin(4)   _____[/2]

c. cot(–0.6)   _____[/2]
    (show your work)
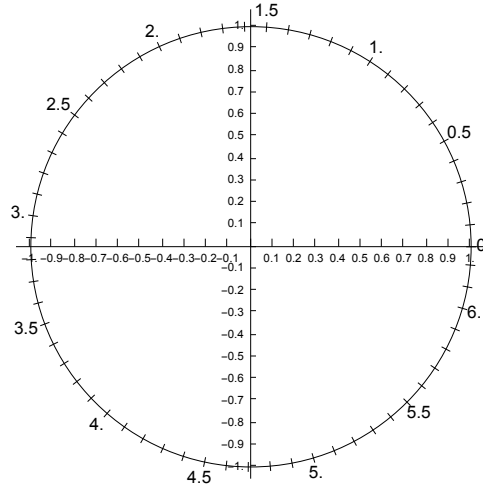
d. If *t* is in quadrant II, and sin(*t*) = 0.3, estimate *t*.   _____[/2]

3) Use unit circles to find the exact value of the product: $\cos\left(\frac{\pi}{6}\right)\cdot\csc\left(\frac{3\pi}{4}\right)$

[/4]

4)   Algebraically determine if the function $f(x) = \dfrac{\sin(x)\cos(x)}{x}$ is odd, even, or neither.

[/4]

5) Given that $\csc(t) = 3$ and $\cos(t) < 0$ find the exact value of the five other trigonometric functions.

[/5]

6) Given the function $f(t) = -20 \cos\left(\frac{\pi}{2} t + \frac{3\pi}{2}\right) + 7$, identify the following:

    a. Amplitude_____   b. Period_____

    c. Vertical Shift   d. Horizontal Shift   [/6]

7) Make an accurate sketch of the function: $f(t) = 3 \sin\left(\frac{1}{2} t - \frac{\pi}{4}\right) + 2$. Show at least two periods and label the axes appropriately.

[/5]

8) Make an accurate sketch of the function: $g(t) = 3 \sec\left(\frac{\pi t}{4}\right)$ Show at least two periods and label the axes appropriately.

[/5]

9)   A *variable star* shines at different brightness throughout the year and can be approximated by a sine function. A particular variable star has brightness measured between 5 and 13, with a period of 45 days.   On day 8 of this year (i.e., January 8th) , it had a brightness of 5. A graph of the brightness is given below.

Brightness

Day
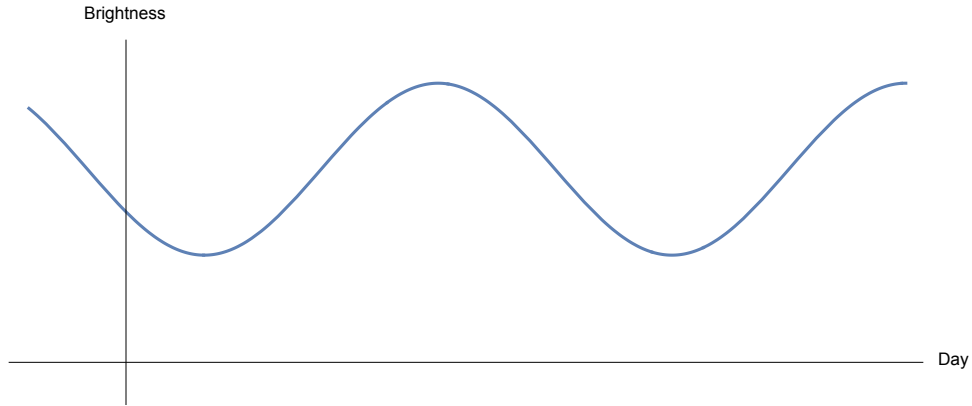
   a.   Find a *sine* function that models the brightness of the star for any day *t*.

[/5]

   b.   Use your model to find the brightness on March 22nd (day 82). Round accurately to two decimal places.

[/2]

Extra Credit: A pendulum is displaced from its resting position 30 inches. It takes 12.8 seconds to complete 4 cycles and had a maximum displacement of 24 inches. Find a damped harmonic model for the displacement of the pendulum at any time *t* and estimate its displacement after 30 seconds.