MATH 112 Exam #2 Review

1. Using techniques that do not involve your calculator or technology, answer the following **exactly**:
   a. Evaluate $\sin\frac{3\pi}{4}$ and $\csc\frac{3\pi}{4}$
   b. Evaluate $\tan\frac{5\pi}{6}$ and $\cot\frac{5\pi}{6}$
   c. Evaluate $\cos\frac{2\pi}{3}$ and $\sec\frac{2\pi}{3}$
   d. Evaluate $\tan\frac{3\pi}{2}$ and $\cot\frac{3\pi}{2}$
   e. Evaluate $\sin\frac{\pi}{2}$ and $\csc\frac{\pi}{2}$
   f. Evaluate $\sin\frac{7\pi}{6}$ and $\csc\frac{7\pi}{6}$
2. If cos(t) = $-\frac{2}{9}$ and t is in the 3rd quadrant, find sin(t) and cot(t).
3. If $sin\theta = \frac{12}{13}$ and $tan\theta < 0$, find $cos\theta$ and $sec\theta$.
4. A guy wire is attached to the top of a 75-foot tower and meets the ground at a 65°angle. How long is the wire? Round to the nearest tenth of a foot.

5. When the sun's angle of elevation is 57°, a building casts a shadow 21 meters long. How high is the building? Round to the nearest tenth of a meter.

6. State the amplitude and period for each function. Then, make a sketch. Be sure the x-axis is labeled in radians.
   a. $y = -3sin2x$ and $b.$ $y = 4\cos\left(\frac{1}{2}x\right)$

7. The population (P) of a city <u>in thousands</u> has grown according to the function $P(t) = 20e^{.05t}$ where t represents years since 2000. Assuming the model is valid,
   a. What was the population of this city in 2013?
   b. In what year will the population of this city reach 24 thousand?

8. If $3500 is invested at 4.25%, compounded **<u>quarterly</u>**,
   a. Write the function that represents the growth of this investment.
   b. How much interest will be earned after 6 years?

9. If $3500 is invested at 4.25%, compounded **<u>continuously</u>**,
   a. Write the function that represents the growth of this investment.
   b. How much interest will be earned after 6 years?

10. ***How much more interest*** will be earned if $3500 is invested for 6 years at 4.25% compounded continuously, instead of at 4.25% compounded quarterly?

11. Find domain, range, asymptote and graph of $f(x) = e^x$ and $m(x) = -e^x + 2$

12. Find domain, range, asymptote and graph of $g(x) = log_3(x)$ and $h(x) = log_3(x-2)$

13. Solve for x:
    a. $log_4 1 = x$
    b. $20.3(1.057)^x = 100$
    c. $log_2 x + log_2(x-2) = 3$
    d. $log_5 x = 6.3$
    e. $13 = 17e^{-.033x}$

14. An isotope of cesium (cesium-137) has a half-life of 30 years. If 1.0 g of cesium-137 disintegrates over a period of 90 years, how many g of cesium-137 would remain?

15. Solve the systems:
    a. $x^2 - y = -2$
       $-x + y = 4$

    b. $x^2 + y^2 = 1$
       $x^2 - y = -1$

    c. $5x + 3y = 11$
       $5x - y = 5$

16. Graph the following circles by identifying the center and radius.
    a. $(x+1)^2 + (y+1)^2 = 16$

    b. $(x-3)^2 + (y-4)^2 = 9$

17. For each circle, identify the center and radius.

a. $x^2 + y^2 - 2x + 6y - 15 = 0$ Center:_____Radius:_____

b. $x^2 + y^2 + 6x - 11 = 0$ Center:_____Radius:_____

c. $x^2 + y^2 + 2x + 10y - 6 = 0$ Center:_____Radius:_____

20. Solve the following inequalities. State the solution in interval notation:

    a. $x^2 - x < 6$
    b. $2x^3 - 3x^2 - 32x > -48$

c. $x^2 + 2x + 4 > 0$

d. $x^2 + 2x + 1 \leq 0$

e. $\frac{x-7}{x+2} \leq 0$

21. Suppose the cost in dollars of producing x units is given by the function $C(x) = 0.2x^2 + 6x + 50$.

a. State the average cost function.

b. State the number of units for which the average cost is less than $20. [Use interval notation].

22. Your college newspaper has fixed production costs of $70 per edition, and printing and distribution costs of 40¢/copy ($0.40/copy). The newspaper sells for 50¢/copy ($0.50/copy).

a. Write the cost function C(x).

b. Write the revenue function R(x).

c. How many copies would need to be made and sold to break even?

23. Use partial fraction decomposition techniques to rewrite the fractions:

a. $\frac{3x+5}{2x^2-5x-3}$ b. $\frac{3x+1}{(x-1)^2(x+2)}$ c. $\frac{5x^2+7x+8}{(x+1)(x^2+2x+3)}$