MAT 122 Homework 3 Name____________________
Due February 20th 1.4 – 1.7

Do your work on separate paper, organize it, and then show your work, here, but *organized* !!!

1. Find two solutions for θ. Give both solutions in degrees *and* radians (which makes for *four* answers). Assume $0^0 \le \theta < 360^0$ and $0 \le \theta < 2\pi$ for the answers in radians.

   a. $\cos\theta = -\dfrac{\sqrt{2}}{2}$

   b. $\sin\theta = \dfrac{\sqrt{3}}{2}$

2. Evaluate the following:

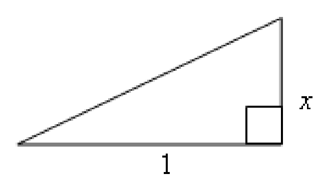
   a. $\arccos\left(-\dfrac{\sqrt{2}}{2}\right)$

   b. $\operatorname{arccot}\left(-\sqrt{3}\right)$

3. Construct a cosine function, $f(x)$, that models daily temperatures in Gunnison Colorado, in midwinter, with a high of 25^0 at 6 p.m. (a bit of a stretch on time of day for peak temperature, I realize...), and a low of -10^0 at 6 a.m. One day represents one period.

4. Sketch the graph of $g(x) = 4\sin(2x - \pi) + 7$ by transforming the function $f(x) = \sin(x)$.

5. In Calculus II, *trigonometric substitution* is a technique for finding the area under the graph of a function involving Pythagorean-type expressions, such as $\sqrt{1 - x^2}$ or $\sqrt{x^2 + 3^2}$. The technique involves evaluating expressions such as $\sin(\arctan(\mathrm{x}))$, by constructing an appropriate right triangle, in this case, one with an angle whose tangent is x. From the triangle, and a little Pythagorean action, we see that $\sin(\arctan(\mathrm{x})) = \dfrac{x}{\sqrt{x^2 + 1}}$. In this spirit, evaluate the following:



a. $\cot(\arctan(\mathrm{x}))$ b. $\tan(\arcsin(\mathrm{x}))$ c. $\sin(\arccos(\mathrm{x}))$

6. Sketch one period of the graph of $g(x) = 5\cot\left(\frac{\pi}{4}x + \pi\right) + 7$, by transforming the function $f(x) = \cot(x)$. I want to see the 3 key points corresponding to $x = \frac{\pi}{4}, \frac{\pi}{2}$, and $\frac{3\pi}{4}$, in the graph of $f(x)$. I want to see where these points are moved by each succeeding transformation you apply to $f(x)$, and where they show up in the final graph of $g(x)$.

7. Now that you have the graph of g, sketch the graph of $y = 5\sqrt{3} + 7$ on the same coordinate axes, and show where it intersects the graph of g.