Homework 4

Math 112

Due February 12th at the start of class

Textbook Exercises

2.4: 2.4.1B, 2.4.2B, 2.4.3B, 2.4.5B

2.5: 2.5.1B, 2.5.2B, 2.5.3B, 2.5.8B, 2.5.9B, 2.5.11B

2.6: 2.6.1B, 2.6.2B, 2.6.3B, 2.6.4B, 2.6.6B, 2.6.9B

Don't rush through 2.6.2B — many of the answers are not what you might expect. For example, $\arcsin(\sin(120°)) \neq 120°$.

3.1: 3.1.1B, 3.1.2B, 3.1.3B, 3.1.4B, 3.1.12B

Exercise 1: Let $f(\theta) = \sin\theta$, where θ is measured in radians.

a) Sketch a graph of f.

b) Apply a transformation to f so that its period is 1, its midline is 2, and its amplitude is 3.

c) Let $g(\theta)$ be the function from part b). Find an interval containing $\theta = 0$ on which g is one-to-one, just like we did when defining the arc functions. Highlight (or in some way mark) the portion of the graph of g on that interval.

d) Now set $y = g(\theta)$ and solve for θ to find a function $G(y)$. Eventually you'll have a sin around θ — to get rid of it, take the arcsin of both sides. You should understand why this is allowed because of the way we restricted the domain of g in the previous step. If not, ask!

e) Finally, sketch a graph of this new function. Plug in a few points to make sure that G takes outputs of g to their corresponding inputs.

Exercise 2: You stand before a skyscraper — or at least, what you think is a skyscraper. You can't tell if it's large and far away or small and close by.

a) Suppose the building is h feet tall and d feet away from you. If you're 6 feet tall and looking up at an angle of $\frac{\pi}{3}$ from the horizontal to see the top, solve for h in terms of d.

b) If the building is 100 feet away from you horizontally, find its height.

c) Continuing with the assumption from part b, find the distance from your **feet** to the top of the building.

d) This building isn't actually all that tall. But if you were still 100 feet away horizontally, and the building were 1000 feet tall, what angle (in radians) would you have to look up at to see the top? Remember that you're still 6 feet tall!

Bonus: Read problem 3.1.C1 (but don't do it unless you really like boring computations).