Homework 5

Math 112

Due February 19th at the start of class

Textbook Exercises

3.2: 3.2.1B, 3.2.2B, 3.2.3B, 3.2.4B, 3.2.5B, 3.2.6B, 3.2.9B

3.3: 3.3.1B, 3.3.2B, 3.3.3B, 3.3.4B, 3.3.5B, 3.3.6B, 3.3.8B, 3.3.11B

Exercise 1: Two runners leave from the same house. The first runs 7 miles due east and then stops, while the second runs at an angle of $\frac{\pi}{6}$ from east toward north. The second runner stops after running 5 miles, then turns and runs straight to the first runner's final position.

a) Sketch a picture of these three trajectories (they form a triangle!)

b) How far will the second runner run **in total** before reaching the first runner?

c) At what angle will the second runner's trajectory intersect the first's? Express your answer in radians.

Exercise 2: Find all solutions to the equation

$$3 + (\sqrt{3})\tan(3x + 5) = 0,$$

where x is in radians. Fully justify your answer, using pictures as necessary, and leave your answer in exact form — don't use a calculator or make decimal approximations.

Bonus: Compute $\cos(\arcsin(x))$ explicitly (so that no trig functions are left). To do this, draw a right triangle with hypotenuse 1 and apply the Pythagorean theorem once you know a second side.