Please show all your work! Answers without supporting work will not be given credit.

Name:__________________________

1. Evaluate: \( \sin(0), \sin\left(\frac{\pi}{6}\right), \sin\left(\frac{\pi}{4}\right), \sin\left(\frac{\pi}{3}\right), \sin\left(\frac{\pi}{2}\right) \). Write each of your answers in the form \( \sqrt{\frac{a}{2}} \).

2. A sector of a circle has a central angle of \( \theta \) radians. Find the area of the sector if the radius of the circle is \( r \). If we double the central angle and keep the radius the same, how much bigger did the area of the sector become? If we double the radius and keep the central angle the same, how much bigger did the area become?
3. The enemy boat is located is at the origin and they can see everything less than 20 miles away. You start at the point \((-30, 0)\). You are traveling to a point on the positive \(y\)-axis \((0, b)\) along a straight line. Your goals are two-fold: you want to travel undetected by the enemy and you want \(b\) in \((0, b)\) to be as small as possible. Find \(b\). [Hint: First, find the equation for the line along which you travel, it will be in terms of \(b\). Next, you want the intersection of your route with the circle \(x^2 + y^2 = 20^2\) to be exactly one point.]