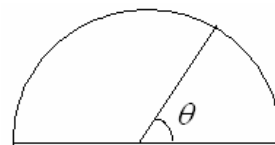


1. A semicircle with radius 1 is partitioned into two adjacent sectors as shown at the right.



A. Find formulas for the areas of the two sectors in terms of θ . Let $f(\theta)$ be the product of these two areas.

B. Your function $f(\theta)$ should be a quadratic function. Use a method from section 4.2 to find the value of θ that maximizes the product of the areas.

2. An equilateral curved triangle is formed from an equilateral triangle. Each curved side is an arc of a circle with center at the opposite vertex and radius equal to the length of the side of the triangle. These special triangles were often used in gothic architecture. Let x be the length of a side of the equilateral triangle.



A. Find a formula for the perimeter of the equilateral curved triangle in terms of x .

B. Find a formula for the area of the equilateral curved triangle in terms of x .

3. The London Ferris Wheel has a diameter of 450 feet and turns continuously at a speed slow enough for passengers to get on and off without stopping the wheel. A single rotation takes 30 minutes. Answer the following questions if you board the wheel at $t = 0$ and you ignore the height of your seat.

A. How high are you above the ground in 7.5 minutes?

B. How far do you travel in one revolution?

4. A. Sketch $\theta = -\frac{7\pi}{6}$ in standard position. Find the exact values of the six trig functions.

B. A positive angle β has its terminal side in quadrant IV. If the terminal side intersects the unit circle at $x = \frac{1}{5}$, find the exact values of the six trig functions.