Math 112: #3 A/B
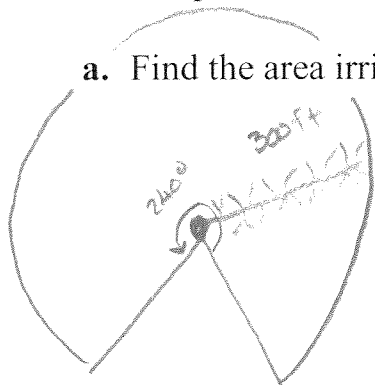
1. An irrigation system uses a straight sprinkler pipe $300ft$ long that pivots around a
   central point. Due to an obstacle the pipe only pivots $240°$.

   a. Find the area irrigated by this system.

$$A = \frac{240°}{360°} \pi (300)^2 \, ft^2$$

or

$$A = \frac{4\pi}{3} \cdot \frac{1}{2} (300)^2 \, ft^2$$

$$= 60,000\pi \, ft^2 \qquad - exact$$

$$\approx 188,495.56 \, ft^2 - rounded$$

$$100,000 \, ft^2$$

   b. How fast will the sprinkler need to turn to irrigate ~~the area~~ in one hour?

$$\omega = \frac{100,000 \, ft^2}{1 \, hour}$$

$$100,000 \, ft^2 = \frac{1}{2} (300 ft)^2 \cdot \theta$$

$$\frac{100,000}{1/2 \cdot 300^2} = \theta = \frac{2.2\overline{2} \, radians}{1 \, hour}$$

   c. $$\omega = \frac{(1 \, mile)^2}{1 \, hour} \qquad \frac{(5280 ft)^2}{1 \, hour}$$

$$27878400 = \frac{1}{2}(300 ft)^2 \cdot \theta \qquad \qquad \frac{619.52 \, radians}{hour}$$

$$\frac{1/2 \cdot 300^2}{} \qquad \frac{1/2 \cdot 300^2}{}$$

$$619.52 \, radians = \theta$$

2. A windshield wiper fixed to a window is $40cm$ long. Assume there is no gap between the pivot point and the wiper. What angular speed is necessary for the wiper to clear $300cm^2$ per second?
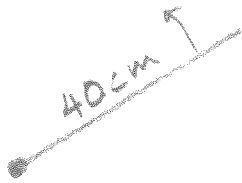
$$300 cm^2 = \frac{1}{2} \cdot 40^2 \cdot \theta$$

$$\frac{300}{\frac{1}{2} \cdot 40^2} = \theta$$

$$0.375 = \theta \qquad \frac{0.375 \text{ radians}}{sec}$$