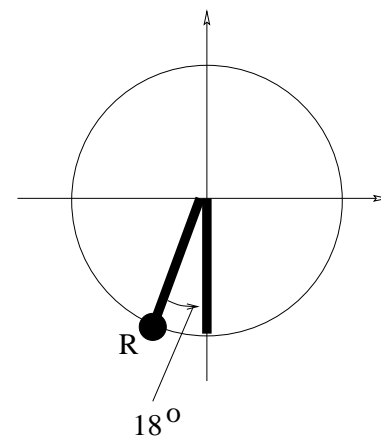
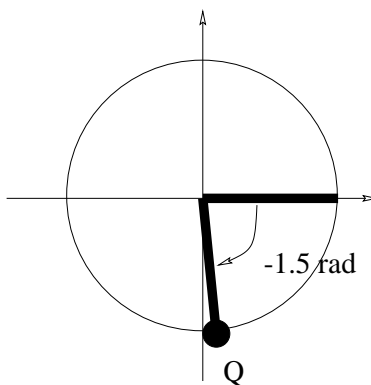
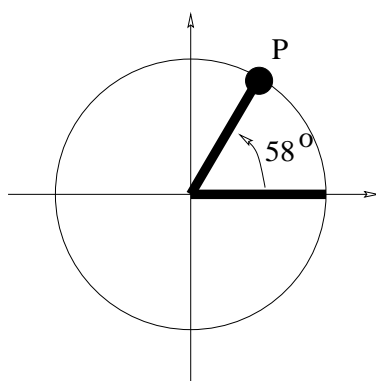

Instructions:

You have 25 minutes. The quiz has three problems. Make sure to show your work for credit. Also, be VERY CAREFUL you are using the correct mode on your calculator.

1.(9pts) For this problem use this picture. Assume each circle has radius 3 ft.



(a) (6pts) Find the coordinates of P, Q and R.

$$P = (3 \cos(58^\circ), 3 \sin(58^\circ)) = (1.59, 2.54)$$

$$Q = (3 \cos(-1.5), 3 \sin(-1.5)) = (0.212, -2.992)$$

$$R = (3 \cos(252^\circ), 3 \sin(252^\circ)) = (-0.927, -2.853)$$

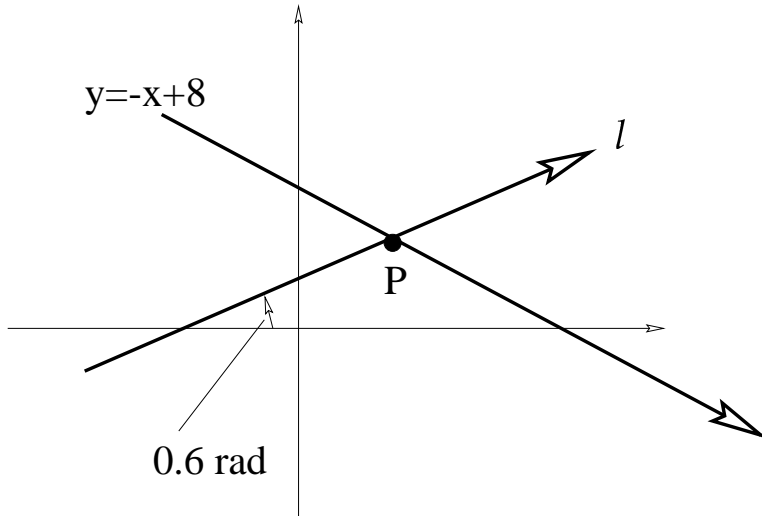
(b) (3pts) Find the length of the arc subtended by each of the three labeled angles.

$$\text{first arc length} = \frac{58}{360}(2\pi 3) = 3.037 \text{ ft.}$$

$$\text{second arc length} = (1.5)3 = 4.5 \text{ ft}$$

$$\text{third arc length} = \frac{18}{360}(2\pi 3) = 0.942 \text{ ft.}$$

2. (6pts) Consider this picture of lines in the xy -coordinate system. Assume the line ℓ has y -intercept 4.



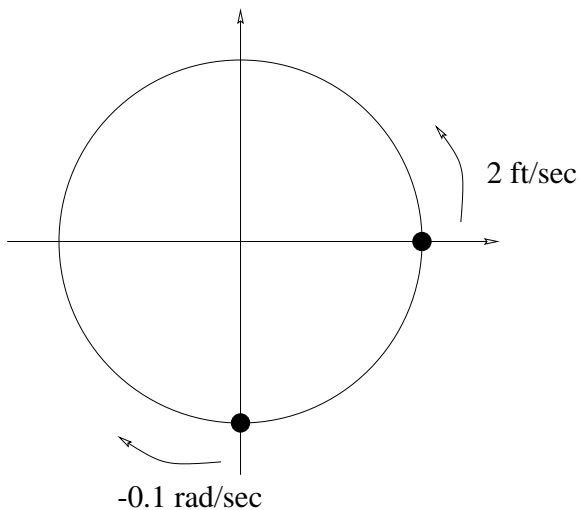
(a) (3pts) Find the equation of line ℓ .

Line ℓ has equation $y = \tan(0.6)x + 4 = 0.684x + 4$.

(b) (3pts) Find the coordinates of the intersection point P .

Simultaneously solve: $0.684x + 4 = -x + 8$; so $x = 2.375$ and $P = (2.375, 5.625)$.

3. (5pts) Two objects begin moving around a circle of radius 100 ft. starting from the locations pictured with the given speeds. Find the coordinates of the point where the two objects collide.



First, we need to get angular speeds both in rad/sec. The object with linear speed 2 ft/sec will have angular speed 0.02 rad/sec. Let $\theta(t)$ be the angle between the two objects at time t seconds. Then

$$\theta(t) = \text{starting angle between} - (0.02 + 0.1)t = \frac{3\pi}{2} - 0.12t.$$

We want to find WHEN $\theta(t) = 0$, so we get $t = 39.27$ seconds. Location of collision P will be $P = (100 \cos(39.27(0.02)), 100 \sin(39.27(0.02))) = (70.71, 70.71)$.