Math 29
PAL Worksheet 21

1. Suppose that the terminal side of an angle ϕ lies in the second quadrant. In what quadrant do each of the following lie?

a. $\phi + \pi$ b. $\phi + \dfrac{\pi}{2}$ c. $-\phi$ d. $\phi - 3\pi$

e. $\phi - \dfrac{3\pi}{2}$ f. $-\phi + \pi$ g. $\dfrac{\pi}{2} - \phi$ h. $-\dfrac{3\pi}{2} - \phi$

2. The terminal side of the angle $\dfrac{5\pi}{7}$ intersects the unit circle at the point $(-0.623, 0.782)$, approximately.

a. Where does the terminal side of the angle $-\dfrac{5\pi}{7}$ intersect the unit circle?

b. Where does the terminal side of the angle $-\dfrac{2\pi}{7}$ intersect the unit circle?

c. Find an angle whose terminal side intersects the unit circle at the point $(0.623, 0.782)$.

d. Find an angle whose terminal side intersects the unit circle at the point $(-0.623, -0.782)$.

e. Find an angle whose terminal side intersects the unit circle at the point $(0.623, -0.782)$.

3. If $\cos\alpha = \dfrac{\sqrt{5}}{6}$ and $\sin\alpha = \dfrac{\sqrt{31}}{6}$, use a picture of the unit circle to find each of the following:

a. $\cos(-\alpha)$

b. $\sin(-\alpha)$

c. $\cos(\alpha + \pi)$

d. $\sin(\alpha + \pi)$

e. $\cos(\pi - \alpha)$

f. $\cos(\alpha - \pi)$

g. $\cos\left(\alpha - \dfrac{\pi}{2}\right)$

h. $\sin\left(\alpha - \dfrac{\pi}{2}\right)$