HW 6 Key

2.6A(1-4 , 6, 7)
3.1A (1-4, 6, 10)
Extra Credit : 3.1A. 11

Section 2.6

1a) 30°

b) -30° or 330°

c) 135°

d) 30°

e) 60°

f) 45°

g) -45° or 315°

2 a) $\arccos(\sin(60)) = \arccos\left(\frac{\sqrt{3}}{2}\right) = 30^\circ$

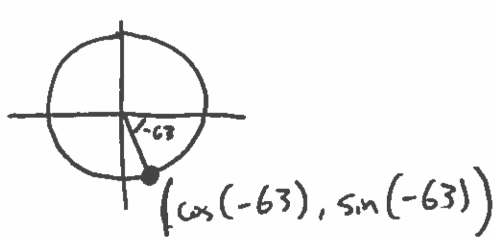
b) $\tan\left(\arcsin\left(\frac{\sqrt{2}}{2}\right)\right) = \tan(45) = 1$

c) $\sin(\arcsin(0.34)) = 0.34$

d) $\arcsin(\sin(-45)) = \arcsin\left(-\frac{\sqrt{2}}{2}\right) = -45$

e) $\arcsin(\sin(120)) = \arcsin\left(\frac{\sqrt{3}}{2}\right) = 60$

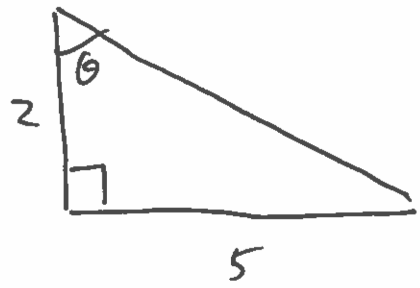
f)



Since arccos outputs angles between 0 and 180, and $\cos(63) = \cos(-63)$, $\arccos(\cos(-63)) = 63$

g) $\arctan(-1) = -45$

3)

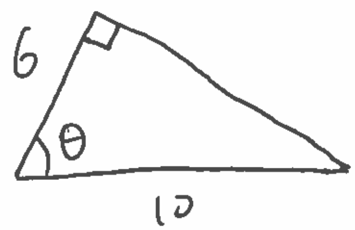


$\tan(\theta) = \frac{5}{2}$

Since θ is in $(-90, 90)$,

$\theta = \arctan(5/2) \approx 68.20°$

4)

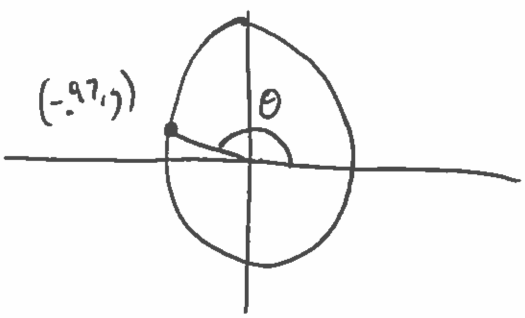


$\cos\theta = \frac{6}{10} = \frac{3}{5}$

Since θ is in $[0, 180]$,

$\theta = \arccos\left(\frac{3}{5}\right) \approx 53.13°$

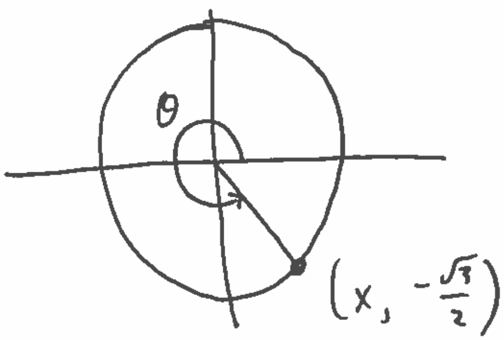
6)



The x-coordinate of the reference point for θ is $\cos(\theta)$, so $\cos(\theta) = -.97$

Since θ is in $[0, 180]$, $\theta = \arccos(-.97) \approx 165.93°$

7)



This is one of our special points, namely $\left(\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$, which corresponds to $\theta = 300°$

Alternatively, you could observe that $\arcsin\left(-\frac{\sqrt{3}}{2}\right) = -60°$, and since $0 \leq \theta \leq 360$, $\theta = 300° \ (= 360 - 60)$

Section 3.1

1a) $225\left(\frac{\pi}{180}\right) = \frac{5\pi}{4} \approx 3.93$

b) $300\left(\frac{\pi}{180}\right) = \frac{5\pi}{3} \approx 5.24$

c) $810\left(\frac{\pi}{180}\right) = \frac{9\pi}{2} \approx 14.14$

d) $10\left(\frac{\pi}{180}\right) = \frac{\pi}{18} \approx 0.17$

e) $60\left(\frac{\pi}{180}\right) = \frac{\pi}{3} \approx 1.05$

f) $231\left(\frac{\pi}{180}\right) = \frac{77\pi}{60} \approx 4.03$

g) $4370\left(\frac{\pi}{180}\right) = \frac{437\pi}{18} \approx 76.27$

2a) $\left(\frac{7\pi}{6}\right)\left(\frac{180}{\pi}\right) = 210^\circ$

b) $\left(\frac{7\pi}{4}\right)\left(\frac{180}{\pi}\right) = 315^\circ$

c) $5\left(\frac{180}{\pi}\right) \approx 286.48^\circ$

d) $(\pi)\left(\frac{180}{\pi}\right) = 180^\circ$

e) $\left(\frac{5\pi}{6}\right)\left(\frac{180}{\pi}\right) = 150^\circ$

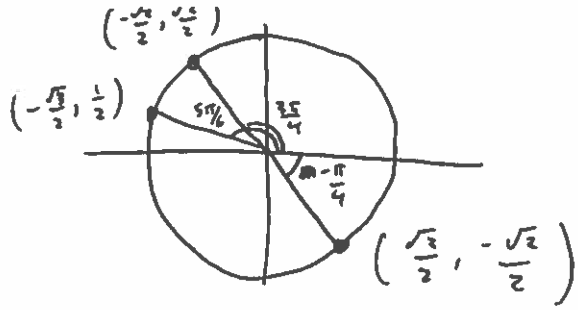
f) $2\left(\frac{180}{\pi}\right) \approx 114.59^\circ$

g) $\left(\frac{17}{5}\right)\left(\frac{180}{\pi}\right) \approx 194.81^\circ$

3a) $\frac{\sqrt{2}}{2}$

b) $\frac{\sqrt{2}}{2}$

c) $-\frac{1}{\sqrt{3}} = \frac{-\sqrt{3}}{3}$



4a) $s = \Phi r = \frac{5\pi}{6} \cdot 6 = 5\pi \approx 15.71$ cm

b) we first need to get Φ in radians

$$\Phi = (145)\left(\frac{\pi}{180}\right) = \frac{29\pi}{36}$$

Then $s = \Phi r = \left(\frac{29\pi}{36}\right)(6) \approx 15.18$ cm

6a) The angle $\theta = \frac{\text{arc length}}{\text{radius}} = \frac{500}{200} = \frac{5}{2}$

b) We first convert $450°$ to radians

$$\theta = (450)\left(\frac{\pi}{180}\right) = \frac{5\pi}{2}$$

Then arc length is $\theta r = \frac{5\pi}{2} \cdot 200 = 500\pi \approx 1570.8$ m

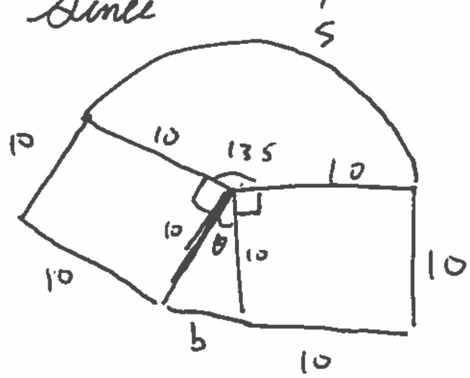
10) The slope of the line is $\tan\theta$

But we know that the slope is $\frac{3-(-3)}{2-(-1)} = 2$,

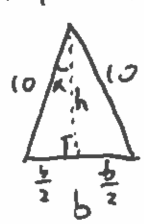
so $\tan(\theta) = 2$

Since $-90 < \theta < 90$, $\theta = \arctan(2) \approx 1.11$

11)



- $s = 10 \cdot \frac{135\pi}{180} = \frac{15\pi}{2}$
- $\theta + 90 + 135 + 90 = 360 \rightarrow \theta = 45°$



- $\alpha = \frac{\theta}{2} = \frac{45°}{2} = 22.5°$

$\rightarrow \sin(\alpha) = \left(\frac{b}{2}\right)/10$

$\rightarrow b = 20\sin(22.5) \approx 7.65$

So the perimeter is $10 + 10 + s + 10 + 10 + b \approx 51.58$