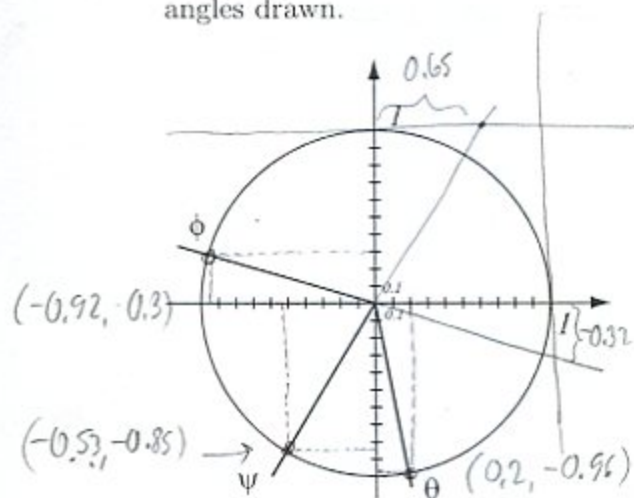


1. (12pts) Use the unit circle to estimate the values of the trigonometric functions of the angles drawn.



$$\cos \psi = -0.53$$

$$\sin \phi = 0.3$$

$$\cos \theta = 0.2$$

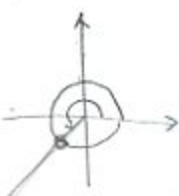
$$\cot \psi = 0.65 \left(\text{or } \frac{-0.53}{-0.85} \right)$$

$$\tan \phi = -0.32 \left(\text{or } \frac{0.3}{0.92} \right)$$

$$\csc \theta = \frac{1}{\sin \theta} = \frac{1}{-0.96} = -1.04$$

2. (18pts) For each of the following, draw the unit circle and the appropriate angle in order to infer from the picture the exact values of the trigonometric functions.

$$\cos 225^\circ = -\frac{\sqrt{2}}{2}$$

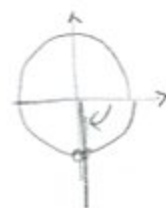


$$\sin \frac{7\pi}{6} = -\frac{1}{2}$$

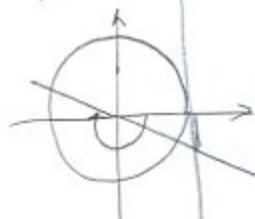


$$\sec(-90^\circ) = \frac{1}{\cos(-90^\circ)} = \frac{1}{0}$$

not defined



$$\tan(-210^\circ) = -\frac{1}{\sqrt{3}}$$

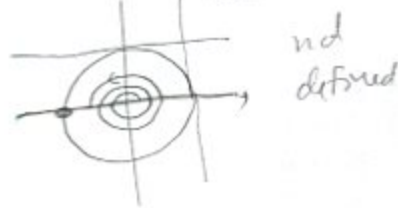


$$\csc \frac{5\pi}{3} = \frac{1}{\sin \frac{5\pi}{3}} = \frac{1}{-\frac{\sqrt{3}}{2}} = -\frac{2}{\sqrt{3}}$$

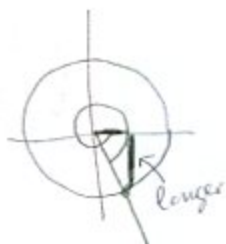


$$\cot(5\pi) = \frac{1}{\tan 5\pi} = \frac{1}{0}$$

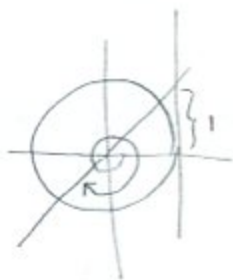
not defined



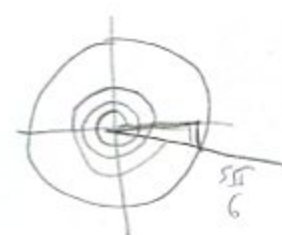
$$\sin(-420^\circ) = -\frac{\sqrt{3}}{2}$$



$$\tan\left(-\frac{11\pi}{4}\right) = 1$$



$$\cos \frac{35\pi}{6} = \cos\left(5\frac{5}{6}\pi\right) = \frac{\sqrt{3}}{2}$$



3. (8pts) Draw two periods of the graph of $y = 3 \cos(2x)$.

What is the amplitude? The period?

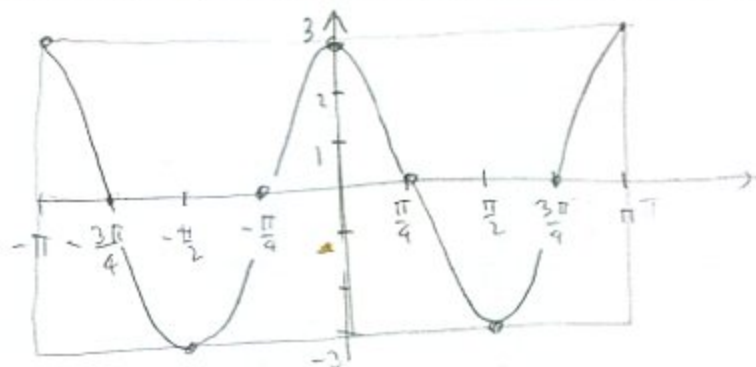
For each period, indicate x-coordinates of the five special points (middle, peaks, valleys).

Amplitude 3
period = $\frac{2\pi}{2} = \pi$

$-\frac{c}{b} = 0$

$-\frac{c}{b} + \frac{2\pi}{b} = \pi$

ticks every $\frac{\pi}{4}$



4. (11pts) Draw two periods of the graph of $y = -2 \sin\left(3x + \frac{\pi}{4}\right)$.

What is the amplitude? The period?

For each period, indicate x-coordinates of the five special points (middle, peaks, valleys).

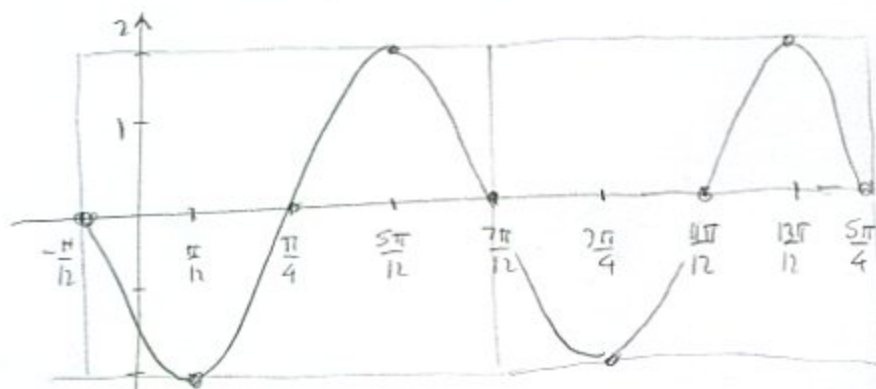
Amplitude = 2

Period = $\frac{2\pi}{3}$

$-\frac{c}{b} = -\frac{\frac{\pi}{4}}{3} = -\frac{\pi}{12}$

$-\frac{c}{b} + \frac{2\pi}{b} = -\frac{\pi}{12} + \frac{2\pi}{3} = \frac{-1+8}{12} \pi = \frac{7\pi}{12}$

ticks every $\frac{2\pi}{3} = \frac{2\pi}{3} = \frac{\pi}{6}$



5. (11pts) Draw two periods of the graph of $y = 2 \sin\left(-4x + \frac{\pi}{2}\right) - 1$.

What is the amplitude? The period? between -2 and 2

For each period, indicate x-coordinates of the five special points (middle, peaks, valleys).

Amplitude = 2

period = $\frac{2\pi}{4} = \frac{\pi}{2}$

$-\frac{c}{b} = -\frac{\frac{\pi}{2}}{-4} = \frac{\pi}{8}$

$-\frac{c}{b} + \frac{2\pi}{b} = \frac{\pi}{8} - \frac{\pi}{2} = -\frac{3\pi}{8}$

ticks every $\frac{\pi}{4} = \frac{\pi}{8}$

