

worksheet 24 solns

1 a. $\sin\left(\frac{7\pi}{6}\right) = \boxed{-\frac{1}{2}}$

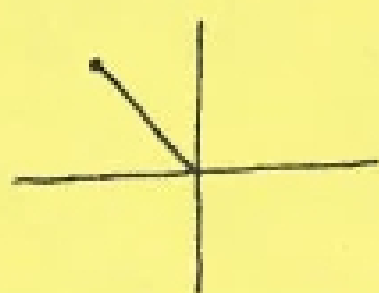
b. $\cot\left(-\frac{11\pi}{3}\right) = \cot\left(\frac{\pi}{3}\right) = \frac{\cos\frac{\pi}{3}}{\sin\frac{\pi}{3}} = \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \boxed{\frac{1}{\sqrt{3}}}$ $-\frac{11\pi}{3} + 4\pi = \frac{\pi}{3}$

c. $\csc\left(-\frac{13\pi}{4}\right) = \csc\left(\frac{3\pi}{4}\right) = \frac{1}{\sin\left(\frac{3\pi}{4}\right)} = \frac{1}{\frac{\sqrt{2}}{2}} = \frac{2}{\sqrt{2}} = \boxed{\sqrt{2}}$

$-\frac{13\pi}{4} + 4\pi = \frac{3\pi}{4}$

2. $\tan \theta < 0$ when θ in Q2 or Q4 $\Rightarrow \theta$ in Q2

$\csc \theta > 0$ when θ in Q1 or Q2



$\frac{1}{\sin \theta} = 7$
 $\sin \theta = \frac{1}{7}$

so $\cos \theta < 0$

$\sin^2 \theta + \cos^2 \theta = 1$

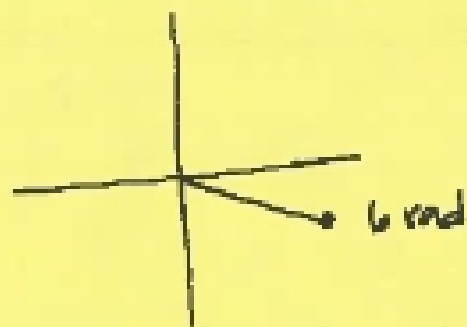
$\left(\frac{1}{7}\right)^2 + \cos^2 \theta = 1$

$\cos^2 \theta = 1 - \frac{1}{49} = \frac{48}{49}$

$\cos \theta = \pm \frac{\sqrt{48}}{\sqrt{49}} = \pm \frac{\sqrt{16 \cdot 3}}{7} = \pm \frac{4\sqrt{3}}{7}$

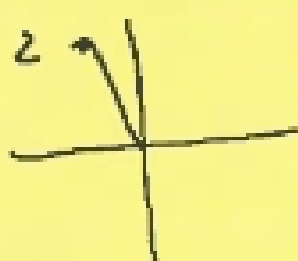
$\boxed{\cos \theta = -\frac{4\sqrt{3}}{7}}$

3. a. $\cos b < \sin b$
 FALSE



$\cos b$ almost 1
 $\sin b$ negative, close to 0

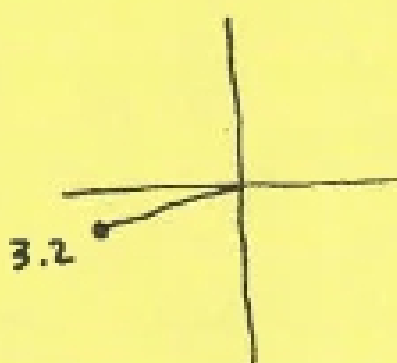
b. $\log_e 3 < \sin 2$
 False



$\sin 2$ between 0 and 1

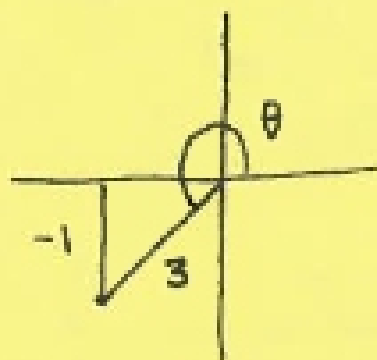
$\log_e 3 = \square$ $e^{\square} = 3$
 must be > 1

c. $\csc(3.2) > \sec(3.2)$
~~True~~ False



$\sin 3.2$ neg, close to 0 $\Rightarrow \csc 3.2$ neg, big
 $\cos 3.2$ neg, close to 1 $\Rightarrow \sec 3.2$ neg, close to 1.

4. θ in Q3



$$\cos \theta < 0$$

$$\tan \theta > 0$$

$$\sin \theta = -\frac{1}{3}$$

$$\sin^2 \theta + \cos^2 \theta = 1$$

$$\left(-\frac{1}{3}\right)^2 + \cos^2 \theta = 1$$

$$\frac{1}{9} + \cos^2 \theta = 1$$

$$\cos^2 \theta = 1 - \frac{1}{9} = \frac{8}{9}$$

$$\cos \theta = \pm \frac{\sqrt{8}}{3} = \pm \frac{2\sqrt{2}}{3}$$

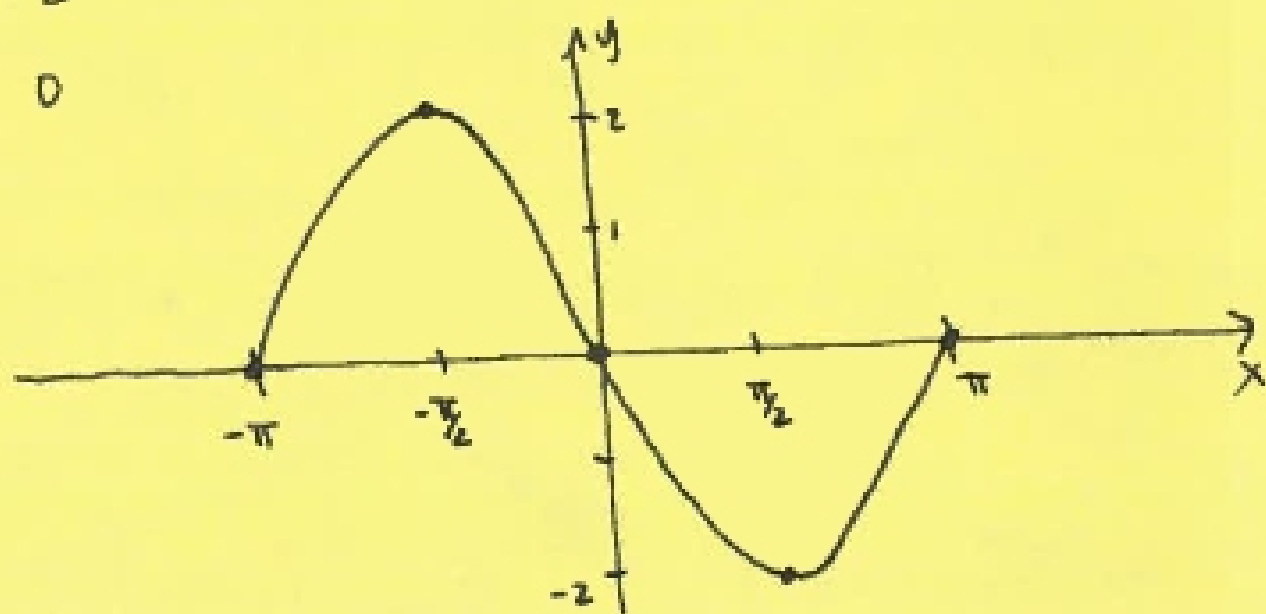
$$\cos \theta = -\frac{2\sqrt{2}}{3}$$

$$\tan \theta = \frac{-\frac{1}{3}}{-\frac{2\sqrt{2}}{3}} = \frac{1}{3} \cdot \frac{3}{2\sqrt{2}} = \frac{1}{2\sqrt{2}}$$

$$= \frac{\sqrt{2}}{4}$$

5.

x	$x + \pi$	$\sin(x + \pi)$	$2 \sin(x + \pi)$
$-\pi$	0	0	0
$-\pi/2$	$\pi/2$	1	2
0	π	0	0
$\pi/2$	$3\pi/2$	-1	-2
π	2π	0	0



$$x + \pi = 0$$

$$-\pi - \pi$$

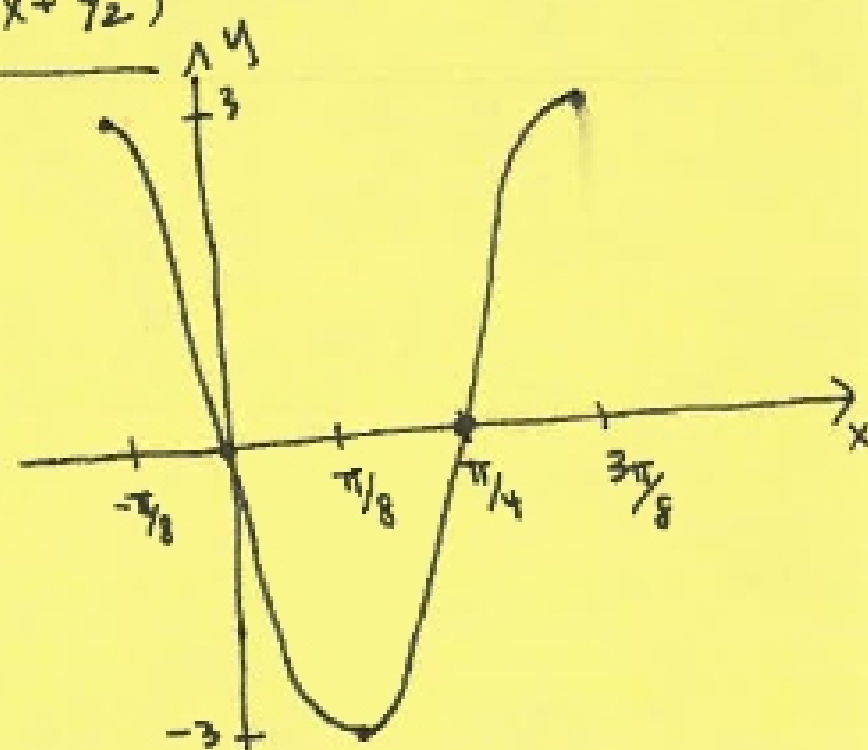
$$x + \pi = \pi/2$$

$$-\pi - \pi$$

$$x = \pi/2 - 2\pi/2 = -\pi/2 \dots$$

6.

x	$4x + \frac{\pi}{2}$	$\cos\left(4x + \frac{\pi}{2}\right)$	$3 \cos\left(4x + \frac{\pi}{2}\right)$
$-\pi/8$	0	1	3
0	$\pi/2$	0	0
$\pi/8$	π	-1	-3
$\pi/4$	$3\pi/2$	0	0
$3\pi/8$	2π	1	3



$$4x + \frac{\pi}{2} = 0$$

$$4x = -\frac{\pi}{2}$$

$$x = -\frac{\pi}{8}$$

$$4x + \frac{\pi}{2} = \frac{\pi}{2}$$

$$4x = 0$$

$$x = 0$$

$$4x + \frac{\pi}{2} = \pi$$

$$-\pi/2 - \pi/2$$

$$4x = \pi/2$$

$$x = \pi/8$$

$$4x + \frac{\pi}{2} = \frac{3\pi}{2}$$

$$4x = \pi$$

$$x = \pi/4$$

$$4x + \frac{\pi}{2} = 2\pi$$

$$4x = \frac{3\pi}{2}$$

$$x = \frac{3\pi}{8}$$