

## Chapter 6 Trig Review

1)  $\sin \theta = 1$

$$\sin^{-1} 1 = \theta$$

$$\boxed{90^\circ = \theta}$$

2)  $\tan \theta = -4.35$

$$\tan^{-1}(-4.35) = \theta$$

$$\boxed{102.9^\circ, 283^\circ = \theta}$$

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

$$2\theta = \cos^{-1}\left(\frac{\sqrt{2}}{2}\right) \text{ for } 0 \leq \theta < 720^\circ$$

$$2\theta = 45^\circ, 315^\circ, 405^\circ, 675^\circ$$

$$\boxed{\theta = 22.5^\circ, 157.5^\circ, 202.5^\circ, 337.5^\circ}$$

4)  $2 - 2\sin \frac{x}{3} = 1$

$$-2\sin \frac{x}{3} = -1$$

$$\sin \frac{x}{3} = \frac{1}{2} \text{ for } 0 \leq x < 120^\circ$$

$$\frac{x}{3} = \sin^{-1} \frac{1}{2}$$

$$\frac{x}{3} = 30^\circ$$

$$\boxed{x = 90^\circ}$$

5)  $\tan^2 \theta = 3$

$$\sqrt{\tan^2 \theta} = \pm \sqrt{3}$$

$$\tan \theta = \pm \sqrt{3}$$

$$\theta = \tan^{-1}(\pm \sqrt{3})$$

$$\boxed{\theta = 60^\circ, 120^\circ, 240^\circ, 300^\circ}$$

$$6) 5 \cos^2 x + 6 \cos x - 8 = 0$$

$$(5 \cos x - 4)(\cos x + 2) = 0$$

$$5 \cos x - 4 = 0 \quad \cos x + 2 = 0$$

$$\cos x = \frac{4}{5}$$

$$\cos x = -2$$

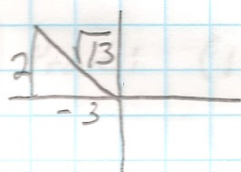
$$\cos^{-1}(-2) = x$$

$$x = \cos^{-1}\left(\frac{4}{5}\right)$$

$$\text{No Sol.} = x$$

$$x = 36.9^\circ, 323.1^\circ$$

$$7) \tan x = -\frac{3}{2} \quad \text{for } \frac{\pi}{2} < x < \pi$$



$$\sin x = \frac{2}{\sqrt{13}}$$

$$\cos x = -\frac{3}{\sqrt{13}}$$

$$a) \sin 2x = 2 \sin x \cos x$$

$$\sin 2x = 2 \left( \frac{2}{\sqrt{13}} \right) \left( -\frac{3}{\sqrt{13}} \right)$$

$$\sin 2x = -\frac{12}{13}$$

$$b) \cos 2x = \cos^2 x - \sin^2 x$$

$$= \left( -\frac{3}{\sqrt{13}} \right)^2 - \left( \frac{2}{\sqrt{13}} \right)^2$$

$$= \frac{9}{13} - \frac{4}{13}$$

$$\cos 2x = \frac{5}{13}$$

$$c) \tan 2x = \frac{2 \tan x}{1 - \tan^2 x}$$

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

$$= \frac{-3}{1 - \frac{9}{4}} = \frac{-3}{-\frac{5}{4}} = -3 \cdot \frac{4}{-5} = \frac{12}{5}$$

$$\tan 2x = \frac{12}{5}$$

8) Prove:  $\frac{\cos(x-y)}{\sin x \cos y} = \cot x + \tan y$

$$\frac{\cos x \cos y + \sin x \sin y}{\sin x \cos y} = \cot x + \tan y$$

$$\frac{\cos x \cos y}{\sin x \cos y} + \frac{\sin x \sin y}{\sin x \cos y} = \cot x + \tan y$$

$$\boxed{\frac{\cos x}{\sin x} + \frac{\sin y}{\cos y} = \cot x + \tan y}$$

9) Prove:  $(1 - \cos^2 x) \csc x = \sin x$

$$\sin^2 x \left( \frac{1}{\sin x} \right) = \sin x$$

$$\boxed{\sin x = \sin x}$$

10) Prove:  $\frac{1 - \sin x}{\sec x} = \frac{\cos^3 x}{1 + \sin x}$  (Cross multiply)

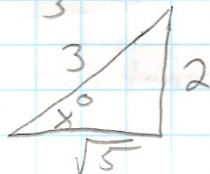
$$(1 - \sin x)(1 + \sin x) = \sec x \cos^3 x$$

$$1 - \sin^2 x = \frac{1}{\cos x} \cdot \frac{\cos^3 x}{1}$$

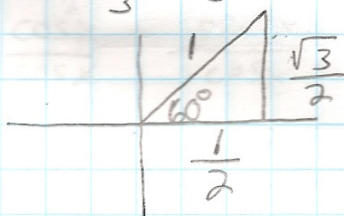
$$1 - \sin^2 x = \cos^2 x$$

$$\boxed{\cos^2 x = \cos^2 x}$$

11) a)  $\sin x = \frac{2}{3}$

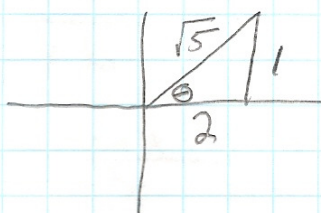


b)  $\cos \frac{\pi}{3} = \theta$



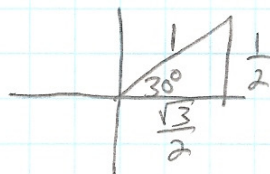
c)  $\theta = \tan^{-1}\left(\frac{1}{2}\right)$

$\tan \theta = \frac{1}{2}$



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

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



e) Same graph

f)  $\sin x = \sin(\pi - x)$  is true at  $0^\circ$  and  $180^\circ$  for  $0 \leq x \leq 360^\circ$

or

$0$  and  $\pi$  for  $0 \leq x < 2\pi$