

1a)  $\sin \frac{\pi}{2} = 1$

b)  $\cos \frac{\pi}{4} = \frac{\sqrt{2}}{2}$

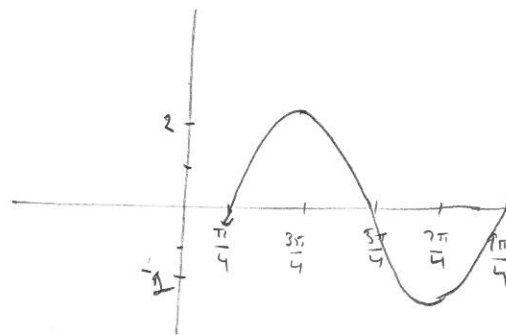
c)  $\tan \frac{2\pi}{3} = -\sqrt{3}$

d)  $\sec \frac{\pi}{3} = 2$

6. period:  $2\pi$

amp: 2

phase shift:  $\pi/4$



2a)  $\cos \frac{7\pi}{6} = -\frac{\sqrt{3}}{2}$

b)  $\cot \frac{5\pi}{4} = 1$

c)  $\sin \frac{11\pi}{6} = -\frac{1}{2}$

d)  $\csc \frac{\pi}{4} = \frac{2}{\sqrt{2}} = \sqrt{2}$

3a)  $\cos \frac{3\pi}{2} = 0$

b)  $\tan \frac{5\pi}{6} = -\frac{1}{\sqrt{3}} = -\frac{\sqrt{3}}{3}$

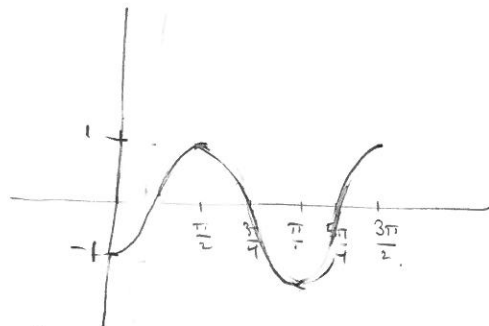
c)  $\cot \frac{\pi}{6} = \sqrt{3}$

d)  $\sec 2\pi = 1$

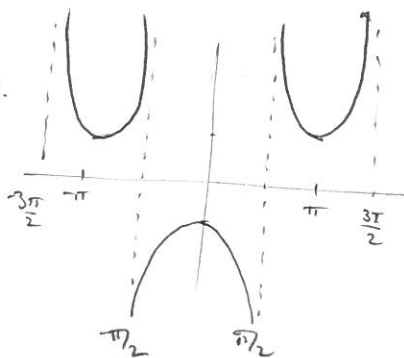
7. period:  $\pi$

amp: 1

phase shift:  $\pi/2$



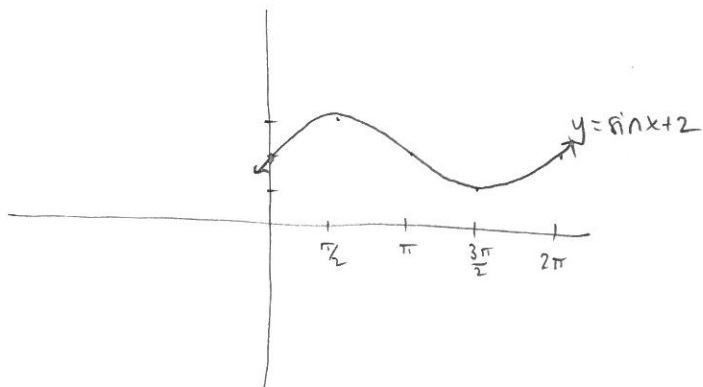
8.



4 a)  $\sin(-\theta) = -\sin \theta = -0.6$

b)  $\cos(\theta - 2\pi) + \cos(\theta + 2\pi) = \cos \theta + \cos \theta = 0.4$

5.



9. a)  $\sin^{-1}(1) = \frac{\pi}{2}$

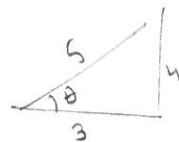
b)  $\cos^{-1}(\frac{\sqrt{2}}{2}) = \frac{\pi}{4}$

c)  $\tan^{-1}(\sqrt{3}) = \frac{\pi}{3}$

d)  $\cot^{-1}(1) = \frac{\pi}{4}$

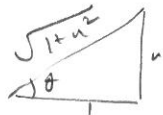
10 a)  $\sin(\cos^{-1}(3/5)) = \frac{4}{5}$

b)  $\tan(\sin^{-1}(-\sqrt{2}/2)) = \tan(-\frac{\pi}{4}) = -1$

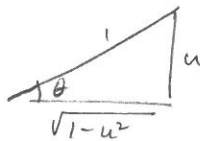


$$11a) \sin(\tan^{-1}u)$$

$$= \frac{u}{\sqrt{1+u^2}}$$



$$b) \sin(2\cos^{-1}(u)) = 2\sin u \cos u \\ = 2u\sqrt{1-u^2}$$



$$12. \frac{1+\tan^2 x}{1+\tan^2 x} + 1 = \frac{1+\tan^2 x}{1+\tan^2 x} + \frac{1+\tan^2 x}{1+\tan^2 x} = \frac{2}{1+\tan^2 x} = \frac{2}{\sec^2 x} = 2\cos^2 x$$

$$13. \frac{1+\sin \theta}{1-\sin \theta} = (\sec \theta + \tan \theta)^2$$

$$\begin{aligned} (\sec \theta + \tan \theta)^2 &= \sec^2 \theta + 2\sec \theta \tan \theta + \tan^2 \theta \\ &= \frac{1}{\cos^2 \theta} + \frac{2\sin \theta}{\cos^2 \theta} + \frac{\sin^2 \theta}{\cos^2 \theta} \\ &= \frac{1 + 2\sin \theta + \sin^2 \theta}{\cos^2 \theta} \\ &= \frac{(1 + \sin \theta)^2}{1 - \sin^2 \theta} \\ &= \frac{(1 + \sin \theta)^2}{(1 + \sin \theta)(1 - \sin \theta)} \\ &= \frac{1 + \sin \theta}{1 - \sin \theta} \end{aligned}$$

$$14. \cot(2\theta) = -\frac{1}{\sqrt{3}} \quad 2\theta = \left\{ \frac{2\pi}{3}, \frac{5\pi}{3} \right\} + 2n\pi \Rightarrow \theta = \left\{ \frac{\pi}{3} + n\pi, \frac{5\pi}{6} + n\pi \right\}$$

15.

$$2\sin^2 \theta - 5\sin \theta + 3 = 0$$

$$(2\sin \theta - 3)(\sin \theta - 1) = 0$$

$$\sin \theta = 3/2$$

$$\sin \theta = 1$$

$$\theta = \frac{\pi}{2} + 2n\pi$$

16.  $\cos(2\theta) = \cos\theta$

$$2\cos^2\theta - 1 = \cos\theta$$

$$2\cos^2\theta - \cos\theta - 1 = 0$$

$$(2\cos\theta + 1)(\cos\theta - 1) = 0$$

$$\cos\theta = -\frac{1}{2}$$

$$\theta = \left\{ \frac{2\pi}{3}, \frac{4\pi}{3} \right\} + 2\pi n$$

$$\cos\theta = 1$$

$$\theta = \{0 + 2\pi n\}$$

or:  $\sin(75^\circ) = \sin(45^\circ + 30^\circ)$

$$= \sin 45 \cos 30 + \cos 45 \sin 30$$

$$= \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} + \frac{\sqrt{2}}{2} \cdot \frac{1}{2}$$

$$= \frac{\sqrt{6} + \sqrt{2}}{4}$$



17.  $\sin(75^\circ) = \sin\left(\frac{150^\circ}{2}\right) = \sqrt{\frac{1 - \cos 150^\circ}{2}} = \sqrt{\frac{1 + \sqrt{3}/2}{2}} = \sqrt{\frac{2 + \sqrt{3}}{4}}$

18.  $\cos(22.5^\circ) = \cos\left(\frac{45^\circ}{2}\right) = \sqrt{\frac{1 + \cos 45^\circ}{2}} = \sqrt{\frac{1 + \sqrt{2}/2}{2}} = \sqrt{\frac{2 + \sqrt{2}}{4}}$

19.  $\frac{\cos(2\theta)}{1 + \sin(2\theta)} = \frac{\cos^2\theta - \sin^2\theta}{1 + 2\sin\theta\cos\theta}$

$$\frac{\cos\theta - 1}{\cos\theta + 1} = \frac{\frac{\cos\theta}{\sin\theta} - 1}{\frac{\cos\theta}{\sin\theta} + 1} \cdot \frac{\sin\theta}{\sin\theta} = \frac{\cos\theta - \sin\theta}{\cos\theta + \sin\theta} \cdot \frac{\cos\theta + \sin\theta}{\cos\theta + \sin\theta} = \frac{\cos^2\theta - \sin^2\theta}{\cos^2\theta + 2\sin\theta\cos\theta + \sin^2\theta}$$

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

20. a)  $\frac{4\pi}{9} \cdot \frac{180^\circ}{\pi} = 80^\circ$

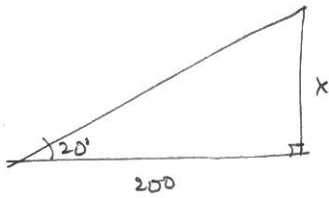
b)  $150^\circ \cdot \frac{\pi}{180^\circ} = \frac{5\pi}{6}$

21.

$$L = r\theta = 4\left(\frac{56\pi}{180}\right) = 3.91$$

$$A = \frac{1}{2}r^2\theta = \frac{1}{2}(4)^2\left(\frac{56\pi}{180}\right) = 7.82$$

22.



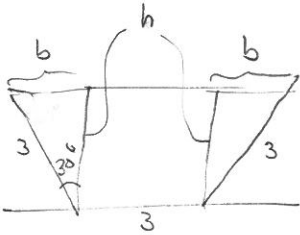
$$x = 200 \tan 20^\circ = 72.8 \text{ ft.}$$

23. Third angle is  $180^\circ - 75^\circ - 45^\circ = 60^\circ$ .

$$\frac{\sin 60^\circ}{x} = \frac{\sin 75^\circ}{3} ; \quad x = \frac{3 \sin 60^\circ}{\sin 75^\circ} = 2.69$$

24.  $y^2 = 4^2 + 8^2 - 2 \cdot 4 \cdot 8 \cdot \cos 110^\circ = 101.9 \Rightarrow y = 10.1$

25.



$$\sin 30^\circ = \frac{b}{3} ; \quad b = 3 \sin 30^\circ = \frac{3}{2}$$

$$\cos 30^\circ = \frac{h}{3} ; \quad h = 3 \cos 30^\circ = \frac{3\sqrt{3}}{2}$$

$$A = 2 \left[ \frac{1}{2} \left( \frac{3}{2} \right) \left( \frac{3\sqrt{3}}{2} \right) \right] + 3 \cdot \frac{3\sqrt{3}}{2}$$

$$= \frac{9\sqrt{3}}{4} + \frac{9\sqrt{3}}{2}$$

$$= 11.7$$