① $\frac{7\pi}{6}$ ② $-\frac{\sqrt{2}}{2}$ ③ $-\sqrt{3}$ ④ II

⑤ negative ⑥ $y = \frac{1}{2}\sin(\pi x) - 4$ ⑦ $\frac{2\pi}{\pi/4} = 8$

⑧ $\frac{3\pi}{4}$ ⑨ where $\sin x = 0$
$0, \pi, 2\pi$

⑩ $-2\cos(2x) = 1$
$\cos(u) = \frac{-1}{2}$
$u = \frac{2\pi}{3}, \frac{4\pi}{3}$
$x = \frac{\pi}{3}, \frac{2\pi}{3}$
these values will occur 4 times each on $[-2\pi, 2\pi]$ because the period is π

⑪ $\left(\frac{3\pi}{4}, \frac{7\pi}{4}\right)$

⑫ $\frac{\tan\alpha}{\cot\alpha} - \frac{\cos\alpha}{\sec\alpha}$

$\frac{\tan\alpha}{\frac{1}{\tan\alpha}} - \frac{\cos\alpha}{\frac{1}{\cos\alpha}}$

$\tan\alpha \cdot \frac{\tan\alpha}{1} - \cos\alpha \cdot \frac{\cos\alpha}{1}$

$\tan^2\alpha - \cos^2\alpha$

⑬ $\frac{\cot x}{\cos x} + \frac{1}{\sin x}$

$\frac{\frac{\cos x}{\sin x} \cdot \sin x + \cos x}{\cos x \sin x}$

$\frac{2\cos x}{\cos x \sin x} = \frac{2}{\sin x} = 2\csc x$

⑭ $2\sin\theta = -\sqrt{2}$
$\sin\theta = -\frac{\sqrt{2}}{2}$
$\sin^{-1}\left(-\frac{\sqrt{2}}{2}\right) = \theta$
$\theta = \frac{5\pi}{4} + 2\pi n$
$\theta = \frac{7\pi}{4} + 2\pi n$

⑮ $4\cos^2\theta = 4$
$\cos^2\theta = 1$
$\cos\theta = \pm 1$
$\cos^{-1}(\pm 1) = \theta$
$\theta = \pi n$

⑯ $\sec x - \sqrt{2} = 0$
$\sec x = \sqrt{2}$
$\cos x = \frac{\sqrt{2}}{2}$
$\cos^{-1}\left(\frac{\sqrt{2}}{2}\right) = x$
$x = \frac{\pi}{4}, \frac{7\pi}{4}$

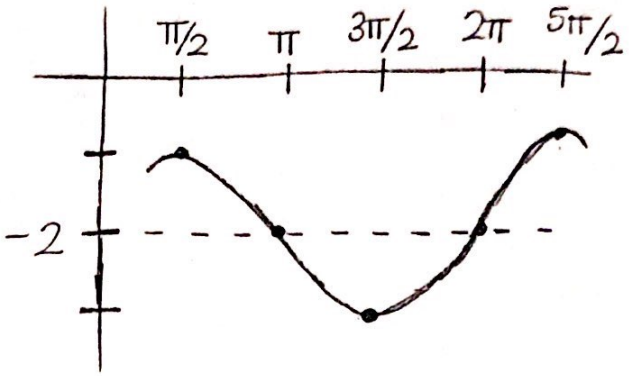
⑰ $\sin 2\theta = -\cos\theta$
$2\sin\theta\cos\theta = -\cos\theta$
$2\sin\theta\cos\theta + \cos\theta = 0$
$\cos\theta(2\sin\theta + 1) = 0$

$\cos\theta = 0$
$\cos^{-1}(0) = \theta$
$\theta = \frac{\pi}{2} + \pi n$

$2\sin\theta + 1 = 0$
$\sin\theta = -\frac{1}{2}$
$\sin^{-1}\left(-\frac{1}{2}\right) = \theta$
$\theta = \frac{7\pi}{6} + 2\pi n$
$\theta = \frac{11\pi}{6} + 2\pi n$

⑱ $\cos\left(\frac{5\pi}{12}\right) = \cos\left(\frac{\pi}{4} + \frac{\pi}{6}\right)$
$\cos\frac{\pi}{4}\cos\frac{\pi}{6} - \sin\frac{\pi}{4}\sin\frac{\pi}{6}$
$\left(\frac{\sqrt{2}}{2}\right)\left(\frac{\sqrt{3}}{2}\right) - \left(\frac{\sqrt{2}}{2}\right)\left(\frac{1}{2}\right)$
$\frac{\sqrt{6} - \sqrt{2}}{4}$

Amp = 1
Period = 2π
Phase Shift = $\frac{\pi}{2}$
Vertical Shift = down 2
Imp Values = $\frac{\pi}{2}$



(20) $2\csc^2 x = \frac{1}{1-\cos x} + \frac{1}{1+\cos x}$

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

$2\csc^2 x = \frac{2}{1-\cos^2 x}$

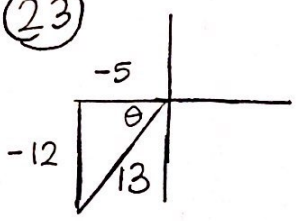
$2\csc^2 x = \frac{2}{\sin^2 x}$

$2\csc^2 x = 2\csc^2 x$

(21) (a) False; pythagorean identity must be squared
(b) False; period of tan/cot is π

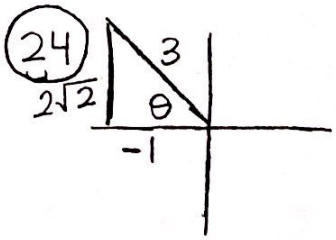
(22) $2\sin^2 x - \sin x - 1 = 0$
$(2\sin x + 1)(\sin x - 1) = 0$
$2\sin x + 1 = 0$ $\quad \sin x - 1 = 0$
$\sin x = \frac{-1}{2}$ $\quad \sin x = 1$
$\sin^{-1}(-\frac{1}{2}) = x$ $\quad \sin^{-1}(1) = x$
$x = \frac{7\pi}{6} + 2\pi n$ $\quad x = \frac{\pi}{2} + 2\pi n$
$x = \frac{11\pi}{6} + 2\pi n$

(23)



$\sin\theta = \frac{-12}{13}$ $\quad \csc\theta = \frac{-13}{12}$
$\cos\theta = \frac{-5}{13}$ $\quad \sec\theta = \frac{-13}{5}$
$\cot\theta = \frac{5}{12}$

(24)



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

$\csc\theta = \frac{3}{2\sqrt{2}} = \frac{3\sqrt{2}}{4}$