

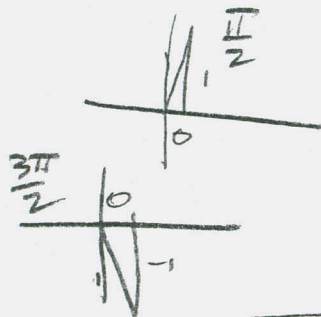
122 Homework #5 §2.5

①  $\sin(2x) \sin x - \cos x = 0$

$2\sin x \cos x \sin x - \cos x = 0$

$\cos x (2\sin^2 x - 1) = 0$

$\cos x = 0$

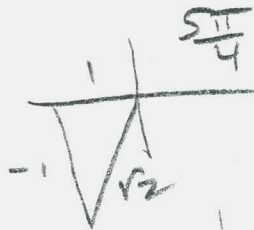
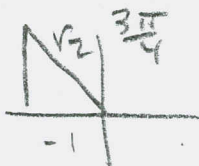
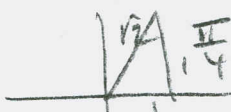


$x = \frac{\pi}{2}, \frac{3\pi}{2},$   
 $\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

$2\sin^2 x = 1$

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

$\sin x = \pm \frac{1}{\sqrt{2}}$



②  $10\sin^2(x) - 5$

$= 10\left(\frac{1 - \cos(2x)}{2}\right) - 5$

$= 5 - 5\cos(2x) - 5$

$= -5\cos(2x)$

③  $\sin^2 x \cos^2 x =$

$\left(\frac{1 - \cos(2x)}{2}\right) \left(\frac{1 + \cos(2x)}{2}\right)$

$= \frac{1}{4}(1 - \cos^2(2x))$

$= \frac{1}{4}\left(1 - \frac{(1 + \cos(4x))}{2}\right)$

$= \frac{1}{4} - \frac{1}{8}(1 + \cos(4x))$

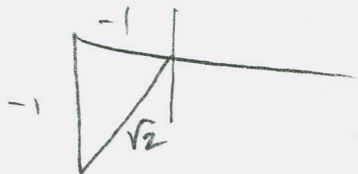
$= \frac{1}{4} - \frac{1}{8} - \frac{1}{8}\cos(4x)$

$= \frac{1}{8} - \frac{1}{8}\cos(4x)$

122 HOMEWORK #5

(4)  $112^{\circ}30' = 112.5^{\circ} = \frac{225^{\circ}}{2}$

$$\sin(112.5) = + \sqrt{\frac{1 - \cos(225^{\circ})}{2}} = \sqrt{\frac{1 + \frac{1}{\sqrt{2}}}{2}}$$



$$= \sqrt{\frac{\sqrt{2} + 1}{2\sqrt{2}}} \quad \text{OR} \quad \sqrt{\frac{2 + \sqrt{2}}{4}} =$$

$$\boxed{\sin(112.5^{\circ}) = \frac{\sqrt{2 + \sqrt{2}}}{2}}$$

$$\cos(112.5^{\circ}) = - \sqrt{\frac{1 + \cos(225^{\circ})}{2}}$$

$$= - \sqrt{\frac{1 - \frac{1}{\sqrt{2}}}{2}} = - \sqrt{\frac{\sqrt{2} - 1}{2\sqrt{2}}} = - \sqrt{\frac{\sqrt{2} - 1}{2\sqrt{2}}}$$

$$\text{OR} - \sqrt{\frac{2 - \sqrt{2}}{4}} = \boxed{- \frac{\sqrt{2 - \sqrt{2}}}{2} = \cos(112.5^{\circ})}$$

So,  $\tan(112.5^{\circ}) = \frac{\sqrt{2 + \sqrt{2}}}{2} \cdot \frac{2}{\sqrt{2 - \sqrt{2}}}$

$$\tan(112.5^{\circ}) = - \sqrt{\frac{2 + \sqrt{2}}{2 - \sqrt{2}}} \quad \text{OR} \quad - \sqrt{\frac{2 + 4\sqrt{2} + 2}{2^2 - \sqrt{2}^2}} = - \sqrt{\frac{4 + 4\sqrt{2}}{2}}$$

$$\tan(112.5^{\circ}) = - \frac{\sqrt{4 + 4\sqrt{2}}}{\sqrt{2}} = - \frac{2\sqrt{1 + \sqrt{2}}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = - \frac{2\sqrt{2 + 2\sqrt{2}}}{2}$$

$$= - \sqrt{2 + 2\sqrt{2}}$$

122 Homework #5

$$\textcircled{5a} \sin(3x)\cos(2x)$$

$$= \frac{1}{2} [\sin(3x+2x) + \sin(3x-2x)]$$

$$= \frac{1}{2} \sin 5x + \frac{1}{2} \sin x$$

$$\textcircled{5b} \sin(5x)\sin(4x)$$

$$= \frac{1}{2} [\cos(5x-4x) - \cos(4x+5x)]$$

$$= \frac{1}{2} [\cos(x) - \cos(9x)]$$