[2] $\sin^2 x \cos^4 x$

$$= \frac{1}{2}(1-\cos 2x) \cdot \left[\frac{1}{2}(1+\cos 2x)\right]^2$$

2 2

$$= \frac{1}{8}(1-\cos 2x)(1+\cos 2x)(1+\cos 2x)$$

$$= \frac{1}{8}(1-\cos^2 2x)(1+\cos 2x)$$

4

$$= \frac{1}{8}\left(1-\frac{1}{2}(1+\cos 4x)\right)(1+\cos 2x)$$

2

$$= \frac{1}{8}\left(\frac{1}{2}-\frac{1}{2}\cos 4x\right)(1+\cos 2x)$$

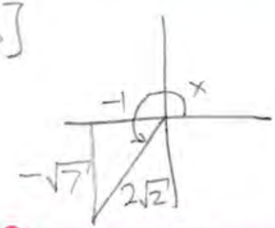
$$= \frac{1}{8}\left(\frac{1}{2}+\frac{1}{2}\cos 2x-\frac{1}{2}\cos 4x-\frac{1}{2}\cos 2x\cos 4x\right)$$

4

$$= \frac{1}{16}+\frac{1}{16}\cos 2x-\frac{1}{16}\cos 4x-\frac{1}{16}\cos 2x\cos 4x$$

1

[3]

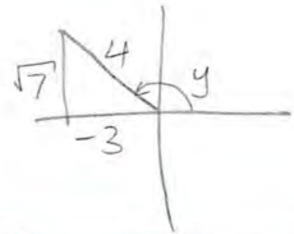


2

LET $y = \arccos\left(-\frac{3}{4}\right)$

2 $\cos y = -\frac{3}{4}$ AND $y \in [0, \pi]$ IE. y IN Q_1 OR Q_2

1 $\cos y < 0 \longrightarrow y$ IN Q_2



2

$$\tan(x-y)$$

$$= \frac{\tan x - \tan y}{1 + \tan x \tan y}$$

2

$$= \frac{\sqrt{7} - -\frac{\sqrt{7}}{3}}{1 + (-\sqrt{7})\left(-\frac{\sqrt{7}}{3}\right)} \cdot \frac{3}{3}$$

3

$$= \frac{3\sqrt{7} + \sqrt{7}}{3 + 7}$$

$$= \frac{4\sqrt{7}}{10}$$

$$= \frac{2\sqrt{7}}{5}$$

4

[4] $\tan x + \tan\left(\frac{\pi}{2} - x\right)$

2 $= \tan x + \cot x$

2 $= \dfrac{\sin x}{\cos x} + \dfrac{\cos x}{\sin x}$

$= \dfrac{\sin^2 x + \cos^2 x}{\cos x \sin x}$

4 $= \dfrac{1}{\sin x \cos x}$

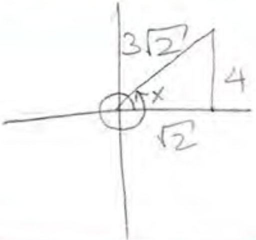
2 $= \dfrac{2}{2 \sin x \cos x}$

$= \dfrac{2}{\sin 2x}$

1 $= 2 \csc 2x$

[5] $x \in [2\pi, \frac{5\pi}{2}) \longrightarrow x$ IN Q_1

2 $\frac{x}{2} \in [\pi, \frac{5\pi}{4}) \longrightarrow$ 1 $\frac{x}{2}$ IN $Q_3 \longrightarrow \cos\frac{x}{2} < 0$



2

$$\cos\frac{x}{2} = -\sqrt{\frac{1+\cos x}{2}} = -\sqrt{\frac{1+\frac{1}{3}}{2}} = -\sqrt{\frac{2}{3}} = -\frac{\sqrt{6}}{3}$$

2 2 2 2

[6] LET $\underset{2}{}\ t = \frac{x}{2}$

$0 \le x < 2\pi \longrightarrow 0 \le \frac{x}{2} < \pi$ IE. 2 $t \in [0, \pi)$

2 $3\cos 2t + 8\sin t + 5 = 0$

4 $3(1 - 2\sin^2 t) + 8\sin t + 5 = 0$

2 $-6\sin^2 t + 8\sin t + 8 = 0$

$-2(3\sin^2 t - 4\sin t - 4) = 0$

2 $-2(3\sin t + 2)(\sin t - 2) = 0$

1 $\sin t = -\frac{2}{3}$ OR 1 $\sin t = 2 \notin [-1, 1]$

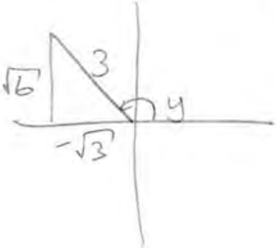
2 NO SOLUTION SINCE $t \in [0, \pi) \longrightarrow \sin t \ge 0$ — 2 NO SOLUTION

2 NO SOLUTION

[7] LET $y = \cos^{-1}\left(-\frac{\sqrt{3}}{3}\right)$

2 $\cos y = -\frac{\sqrt{3}}{3}$ AND $y \in [0, \pi]$ IE. y IN Q_1 OR Q_2

1 $\cos y < 0 \longrightarrow y$ IN Q_2



$\sin 2y = 2 \sin y \cos y$ 2

$= 2\left(\frac{\sqrt{6}}{3}\right)\left(-\frac{\sqrt{3}}{3}\right)$ 2

$= \frac{2(3\sqrt{2})}{9} = \frac{2\sqrt{2}}{3}$ 2

[8] $\sin 6x$

$= \sin 2(3x)$

2 $= 2\sin 3x \cos 3x$

8 $= 2(3\sin x - 4\sin^3 x)(4\cos^3 x - 3\cos x)$

FROM TEXTBOOK FROM LECTURE

$= 2(12\sin x\cos^3 x - 9\sin x\cos x - 16\sin^3 x\cos^3 x$
$+ 12\sin^3 x\cos x)$

4 $= -32\sin^3 x\cos^3 x + 24\sin^3 x\cos x + 12\sin x\cos^3 x - 18\sin x\cos x$