

Name : ..... **KEY** ..... ID: ..... Sec: .....

1) The value of  $\cos \left[ 2 \sin^{-1} \left( \frac{-5}{6} \right) \right]$  is equal to

- a)  $\sqrt{11}$
- b)  $\frac{-5}{6}$
- c)  $\frac{\sqrt{11}}{6}$
- d)  $-\frac{7}{18}$
- e) 1

Let  $\theta = \sin^{-1} \left( \frac{-5}{6} \right) \Rightarrow \sin \theta = \frac{-5}{6}$

$\hookrightarrow = \cos 2\theta$

$= 1 - 2 \sin^2 \theta = 1 - 2 \left( \frac{25}{36} \right) = \frac{-14}{36}$

$= \frac{-7}{18}$

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

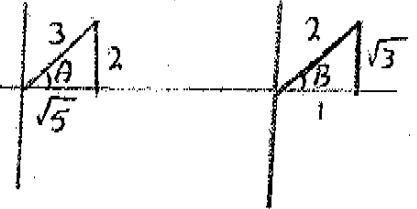
- a)  $\frac{2}{3}$
- b)  $\frac{2 + \sqrt{15}}{6}$
- c) 0
- d)  $\frac{2 - \sqrt{15}}{2}$
- e)  $-\frac{2}{3}$

$= \sin(A+B)$  where  $\sin A = \frac{2}{3}$  and  $\cos B = \frac{1}{2}$

$= \sin A \cos B + \cos A \sin B$

$= \left( \frac{2}{3} \right) \left( \frac{1}{2} \right) + \left( \frac{\sqrt{5}}{3} \right) \left( \frac{\sqrt{3}}{2} \right)$

$= \frac{2 + \sqrt{15}}{6}$



3) The solution of  $\sin^{-1} \frac{3}{5} + \cos^{-1} x = \frac{\pi}{4}$  is

- a)  $\sqrt{2}$
- b)  $-\sqrt{2}$
- c)  $\frac{-\sqrt{2}}{2}$
- d)  $\frac{7\sqrt{2}}{10}$
- e)  $\frac{\sqrt{2}}{10}$

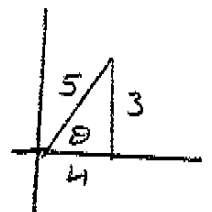
$\Rightarrow \cos^{-1} x = \frac{\pi}{4} - \sin^{-1} \frac{3}{5}$

$\Rightarrow x = \cos \left( \frac{\pi}{4} - \theta \right)$  where  $\sin \theta = \frac{3}{5}$

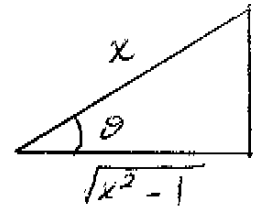
$= \cos \frac{\pi}{4} \cos \theta + \sin \frac{\pi}{4} \sin \theta$

$= \frac{\sqrt{2}}{2} \cdot \frac{4}{5} + \frac{\sqrt{2}}{2} \cdot \frac{3}{5}$

$= \frac{7\sqrt{2}}{10}$



4)  $\tan(\csc^{-1} x) = \tan \theta$  where  $\csc \theta = x$



a)  $\frac{\sqrt{1-x^2}}{1-x^2} = \frac{1}{\sqrt{x^2-1}} = \frac{\sqrt{x^2-1}}{x^2-1}$

b)  $\frac{\sqrt{1-x^2}}{1-x^2}$

c)  $\frac{\sqrt{1-x^2}}{x^2-1}, x > 1$

d)  $\frac{-\sqrt{1+x^2}}{1+x^2}$

for  $x < -1$  or  $x > 1$

5) The equation  $\sin x \cos 2x - \cos x \sin 2x = \frac{\sqrt{3}}{2}$ , on the interval  $[0, 2\pi)$ , has

- a) six solutions
- b) three solutions
- c) two solutions
- d) no solution

$$\begin{aligned} \sin(x-2x) &= \frac{\sqrt{3}}{2} \\ \Rightarrow \sin x &= -\frac{\sqrt{3}}{2} \Rightarrow \begin{cases} x = \frac{4\pi}{3} + k(2\pi) \\ x = \frac{5\pi}{3} + k(2\pi) \end{cases} \end{aligned}$$

$$\Rightarrow \text{S.S.} = \left\{ \frac{4\pi}{3}, \frac{5\pi}{3} \right\}$$

6) The equation  $\cos^2 x + 4 = 2\sin x - 3$  has

- a) one solution
- b) two solution
- c) three solutions
- ✓ d) no solution

$$\begin{aligned} 1 - \sin^2 x + 4 - 2\sin x + 3 &= 0 \\ \text{or } \sin^2 x + 2\sin x - 8 &= 0 \\ \Rightarrow \sin x &= 2 \text{ or } \sin x = -4 \end{aligned}$$

7) Find all solutions of the equation  $\cos\left(2x - \frac{\pi}{4}\right) = -\frac{\sqrt{2}}{2}$

$$\begin{array}{ccc} \swarrow \text{Q III} & & \searrow \text{Q II} \\ 2x - \frac{\pi}{4} = \frac{5\pi}{4} + k(2\pi) & \text{or} & 2x - \frac{\pi}{4} = \frac{3\pi}{4} + k(2\pi) \end{array}$$

$$\Rightarrow x = \frac{3\pi}{4} + k(\pi)$$

$$x = \frac{\pi}{2} + k(\pi)$$