SIIT MAS117 - SUMMER 2007 - QUIZ 1 - Section 1

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1. Given the parametric equations $x(t) = t + \cos t$; $y(t) = t + \sin t$, the slope of the tangent line to this curve at $t = \pi/6$ is

1) $\frac{2\pi}{9}$; 2) $\frac{\sqrt{3}+1}{2}$; 3) $\frac{1+\pi}{1-\pi}$; 4) $2+\sqrt{3}$; 5) 1

The answer is 4

$\frac{dy}{dx} = \frac{1+\cos t}{1-\sin t}$. If $t = \pi/6$, $\frac{dy}{dx} = \frac{1+\frac{\sqrt{3}}{2}}{1-\frac{1}{2}} = 2+\sqrt{3}$

2. The angle between the vectors **u** = **i** + 2**j** + **k** and **v** = **j** –2**k** is

1) $\pi/6$, 2) $4\pi/3$; 3) 0; 4) $\pi/2$; 5) $\pi/4$

The answer is 4. Applying the formula for the angle between two vectors,

$\cos\theta = \frac{u \bullet v}{\|u\|\|v\|} = \frac{(1\times 0 + 2\times 1 + 1\times(-2)}{\sqrt{6}\sqrt{5}} = 0$. Therefore, $\theta = \pi/2$

3) The graph of the polar function $r = \theta$ is

1) A four-petal rose curve; 2) A circle with center at the origin and radius 1; 3) A circle with center at (0, ½) and radius ½; 4) A spiral; 5) None of the above

The answer is 4 (It is on the book and on the notes)

4) The direction angles of the vector **u** = **i** – **j** are:

1) $\alpha = \pi/3,\ \beta = \pi/4,\ \gamma = 4\pi/3$; 2) $\alpha = \pi/4,\ \beta = 3\pi/4,\ \gamma = \pi/2$; 3) $\alpha = \pi,\ \beta = \pi/2,\ \gamma = -\pi/2$;

4) $\alpha = \pi/3,\ \beta = \pi/6,\ \gamma = 3\pi/2$; 5) $\alpha = \pi/6,\ \beta = \pi/6,\ \gamma = 0$;

The answer is 2. Applying the direction angles formula

$$\cos\alpha = \frac{u_1}{\|u\|} = \frac{1}{\sqrt{2}} \Rightarrow \alpha = \frac{\pi}{4} \qquad \cos\beta = \frac{u_2}{\|u\|} = \frac{-1}{\sqrt{2}} \Rightarrow \beta = \frac{3\pi}{4} \qquad \cos\gamma = \frac{u_3}{\|u\|} = 0 \Rightarrow \gamma = \frac{\pi}{2}$$