جامعة الملك سعود
King Saud University

Name: Answer
ID:
Num of attendance:

Time: 40 Min **Quiz 2 - Math 107- Semester II- 1443 H** Marks: 10

Q.1) Find the distance d between the point $(1, -4, -2)$ and the plane $4x - 2y + 6z = 3$.

Answer:

$A(x_0 = 1;\ y_0 = -4;\ z_0 = -2)$

Plane (P): $4x - 2y + 6z - 3 = 0$; $a = 4;\ b = -2;\ c = 6;\ d = -3$

The distance d between A and the Plane (P) is given by

(3)

$$d = \frac{|ax_0 + by_0 + cz_0 + d|}{\sqrt{a^2 + b^2 + c^2}} = \frac{|4 + 8 - 12 - 3|}{\sqrt{16 + 4 + 36}} = \frac{3}{\sqrt{56}} = \frac{3}{2\sqrt{14}}$$

Q.2) Let $\vec{r}(t) = (\ln t)\vec{i} + e^{-4t}\vec{j} + \frac{\cos t}{\sqrt{1-t}}\vec{k}$. Find the domain of $\vec{r}$.

Answer:

(2)

The domain of $\vec{r}$ is $\{t \in \mathbb{R} \ / \ t > 0 \text{ and } 1 - t > 0\} = (0, 1)$

Q.3) Find the tangential component of acceleration at time t for the curve C determined by the vector of position:

$$\vec{r}(t) = 2t^3\vec{i} + 3\sin t\vec{j} + 2\cos t\vec{k}.$$

(5)

Answer:

$$a_T = \frac{\vec{r}'(t) \cdot \vec{r}''(t)}{\|\vec{r}'(t)\|}$$

$$\vec{r}'(t) = 6t^2\vec{i} + 3\cos t\vec{j} - 2\sin t\vec{k}$$

$$\vec{r}''(t) = 12t\vec{i} - 3\sin t\vec{j} - 2\cos t\vec{k}$$

$$\vec{r}'(t) \cdot \vec{r}''(t) = 72t^3 - 9\sin t\cos t + 4\sin t\cos t$$

$$\|\vec{r}'(t)\| = \sqrt{(6t^2)^2 + (3\cos t)^2 + (-2\sin t)^2}$$

We get $a_T = \dfrac{72t^3 - 5\sin t\cos t}{\sqrt{36t^4 + 9\cos^2 t + 4\sin^2 t}}$

End of quiz