King Saud University

Name: Answer Sheet (Dr Borhen)

ID: ....

Num of attendance: .....

Time: 35 min | **Quiz 2 - Math 205 - Trimester 3 - 1444 H** | Marks: 10

Q1) Find the distance between two planes

$$2x + 6y - 8z + 4 = 0 \text{ and } 3x + 9y - 12z - 4 = 0. \qquad [2 \text{ marks}]$$

Answer: $P_1 : 2x + 6y - 8z + 4 = 0$

The normal vector for P_1 is $\vec{n_1} = \langle 2, 6, -8 \rangle$

$P_2 : 3x + 9y - 12z - 4 = 0$. The normal vector for P_2 is $\vec{n_2} = \langle 3, 9, -12 \rangle$

1 As $\frac{2}{3} = \frac{6}{9} = \frac{-8}{-12}$ then $P_1 \parallel P_2$.

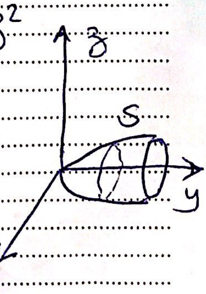
Let $A = (-2, 0, 0) \in P_1$.

1 Then $d = \frac{|3\times(-2) + 9\cdot 0 - 12\times 0 - 4|}{\sqrt{3^2 + 9^2 + (-12)^2}} = \frac{10}{\sqrt{234}}$

Q2) Sketch the graph of $y = 6x^2 + z^2$, and identify the surface. [3 marks]

Answer:

1 The equation of the surface $y = 6x^2 + z^2$ is a paraboloid



- When $y = 0$ the origin $O(0,0,0)$ in the xz-plane.
- 2 When $x = 0$: $y = z^2$ Parabola in the yz-plane
- When $z = 0$; $y = 6x^2$ equation of Parabola in the xy-plane

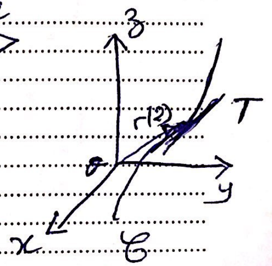
Q3) Find parametric equations for the tangent line to C given by

$$\mathbf{r}(t) = (t^2 - t)\mathbf{i} + (2t^2 + 1)\mathbf{j} + (t^3 - 1)\mathbf{k} \text{ at } t = 2. \quad [3 \text{ Marks}]$$

Answer: $r(t) = \langle t^2 - t ; 2t^2 + 1 ; t^3 - 1 \rangle$

1 $r(2) = \langle 2 ; 9 , 7 \rangle$

$v(t) = \frac{d}{dt} r(t) = \langle 2t - 1 ; 4t ; 3t^2 \rangle$



1 $v(2) = \langle 3 , 8 , 12 \rangle$

The parametric equations for the tangent line to C at $t = 2$ is

1 $T : \begin{cases} x(t) = 2 + 3t \\ y(t) = 9 + 8t \quad ; \; t \in \mathbb{R} \\ z(t) = 7 + 12t \end{cases}$

Q4) Show that the $\lim\limits_{(x,y)\to(0,0)} \dfrac{5x^3y^2}{2x^5 + 4y^5}$ does not exist. [2 Marks]

Answer:

Let $l_m : y = mx$ lines passes through $(0,0)$

2 $\lim\limits_{\substack{(x,y) \in l_m \\ (x,y) \to (0,0)}} \dfrac{5x^3y^2}{2x^5 + 4y^5} = \lim\limits_{x \to 0} \dfrac{5m^2x^5}{2x^5 + 4m^5x^5} = \dfrac{5m^2}{2 + 4m^5}$

It depends of m

So $\lim\limits_{(x,y)\to(0,0)} \dfrac{5x^3y^2}{2x^5 + 4y^5}$ does not exist.

End of quiz