

CALCULUS III: HW 3

QUESTION 1

Find an equation in rectangular coordinates (x and y) for the curve with parametric equations $x = \sqrt{t}$, $y = t^2$.

QUESTION 2

Find parametric equations for the circle with center $(-1, 5)$ and radius 2.

QUESTION 3

Find an equation for the line through the points $P = (1, -2, 3)$ and $Q = (4, 0, 5)$.

QUESTION 4

Consider the line L_1 with equation $\langle x, y, z \rangle = \langle 3, -1, 2 \rangle + t \langle 0, 4, 1 \rangle$.

(a). Find an equation for the line containing the point $(1, 0, 1)$ which is parallel to L_1 .

(b). The line L_2 has symmetric equations

$$\frac{x-3}{-1} = \frac{y+1}{-1} = \frac{z-2}{4}$$

Find the angle between L_1 and L_2 .

QUESTION 5

Find the intersection point between the lines

$$\langle x, y, z \rangle = \langle -1, 3, 0 \rangle + t \langle 2, -2, -4 \rangle$$

and

$$\langle x, y, z \rangle = \langle 1, 1, 2 \rangle + s \langle 1, -1, 0 \rangle .$$

QUESTION 6

Consider the lines L_1 and L_2 , where L_1 has parametric equations

$$x = 1 + t, y = 8 - 2t, z = -1 + t$$

and L_2 has parametric equations

$$x = 1 - 2s, y = 3 + s, z = 4s$$

Are these lines parallel, intersecting, or skew? Justify your answer.

QUESTION 7

Consider the line L with symmetric equation

$$\frac{x-1}{3} = \frac{y}{2} = z+4$$

(a). Find parametric equations and a vector equation for the line L .

- (b). Find an equation for the plane which contains the point $P = (1, 2, 3)$ and is perpendicular to the line L .

QUESTION 8

Find an equation for the plane containing the points $P = (0, -2, -3)$, $Q = (2, -1, -5)$, and $R = (-1, 0, -2)$.

QUESTION 9

- (a). Find the angle between the line $x = t$, $y = 3 - t$, $z = 2 + 2t$ and the plane $2x + y + z = 0$.
(b). Find the intersection of the line and plane in part (a).

QUESTION 10

Find the distance between the point $(1, -4, 0)$ and the plane $-2x + 2y - z = 3$.

QUESTION 11

Consider the line L_1 , with symmetric equations

$$\frac{x - 3}{2} = \frac{y - 4}{-1} = \frac{z - 1}{3}$$

and L_2 , with symmetric equations

$$\frac{x - 1}{4} = \frac{y - 3}{-2} = \frac{z - 4}{5}$$

- (a). Show that L_1 and L_2 are skew.
(b). Find an equation for the plane containing L_1 which is parallel to L_2 .