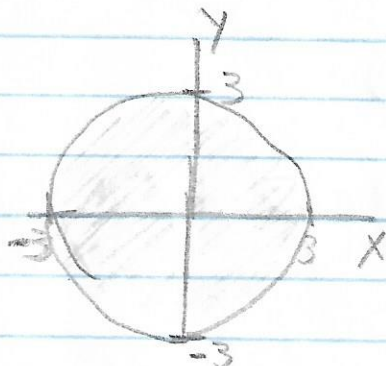


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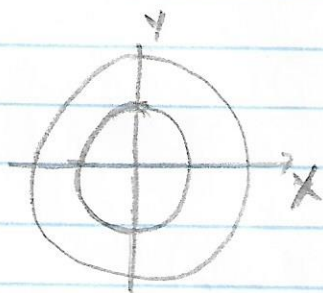
Fundamentos Matemáticos Examen 1

1 a)



$$D = \{(x, y) \in \mathbb{R}^2 : x^2 + y^2 \leq 9\}$$

b) $k=1, k=2$



c) $I = \{R : 0 \leq z \leq 3\}$

d) $f(x, y)$ es continua en $(0, 0)$ porque la resolante es una constante 3

2

$$H = y\hat{i} + x^2\hat{j}$$

$$x(r, \theta) = r \cos \theta$$

$$y(r, \theta) = r \sin(\theta)$$

$$f_1(x, y) = y\hat{i}, f_2(x, y) = x^2\hat{j}$$

$$\frac{\partial H}{\partial \theta} = \left(\frac{\partial f_1}{\partial x} \frac{\partial x}{\partial \theta} + \frac{\partial f_1}{\partial y} \frac{\partial y}{\partial \theta} \right) \hat{i} + \left(\frac{\partial f_2}{\partial x} \frac{\partial x}{\partial \theta} + \frac{\partial f_2}{\partial y} \frac{\partial y}{\partial \theta} \right) \hat{j}$$

$$= \left(\frac{\partial f_1}{\partial y} \frac{\partial y}{\partial \theta} \right) \hat{i} + \left(\frac{\partial f_2}{\partial x} \frac{\partial x}{\partial \theta} \right) \hat{j}$$

$$= \left(\frac{\partial y}{\partial y} \frac{\partial r \sin(\theta)}{\partial \theta} \right) \hat{i} + \left(\frac{\partial x^2}{\partial x} \frac{\partial r \cos(\theta)}{\partial \theta} \right) \hat{j}$$

$$= 2r \cos(\theta) \hat{i} + (2x)(-r \sin(\theta)) \hat{j}$$

$$\text{evaluamos en } (0, 0) = 0$$

$$3.- F(x, y) = -y\hat{i} + x\hat{j}$$

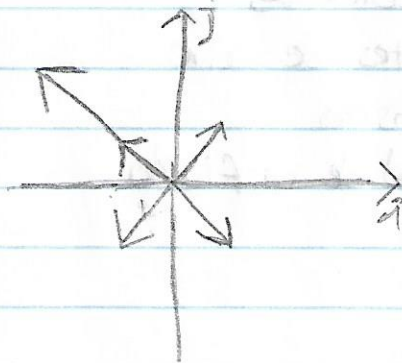
$$F(1, 1) = -(1)\hat{i} + 1\hat{j}$$

$$F(-1, -1) = -(-1)\hat{i} + (-1)\hat{j}$$

$$F(1, -1) = -(1)\hat{i} + (-1)\hat{j}$$

$$F(-1, 1) = -(-1)\hat{i} + 1\hat{j}$$

$$F(2, 2) = -(2)\hat{i} + 2\hat{j}$$



$$4.- y^2 + xz + z^2 - e^z - z = 0$$

$$\frac{\partial z}{\partial x} = \frac{\partial(y^2)}{\partial x} + \frac{\partial(xz)}{\partial x} + \frac{\partial(z^2)}{\partial x} - \frac{\partial(e^z)}{\partial x} - \frac{\partial z}{\partial x}$$

5.-

Campos Vectoriales :

1. Corrientes de aire
2. Magnetismo
3. velocidad de un fluido

Campos escalares :

- 1.- Difusión temperatura
2. dispersión de fluidos