Lista de Fórmulas para el Examen Final de Matemáticas para Ingeniería III

Ecuaciones Paramétricas de una Recta:

$$x = x_0 + at$$
$$y = y_0 + bt$$
$$z = z_0 + ct$$

Diferencial total de una función:

$$Si \quad w = w(x, y, z) \quad \Rightarrow$$
$$dw = \frac{\partial w}{\partial x}dx + \frac{\partial w}{\partial y}dy + \frac{\partial w}{\partial z}dz$$

Regla de la Cadena:

$$w = (x, y, z) \quad ; \quad x = f(r, s, t);$$
$$y = g(r, s, t) \quad ; \quad z = h(r, s, t)$$

$$\frac{\partial w}{\partial r} = \frac{\partial w}{\partial x}\frac{\partial x}{\partial r} + \frac{\partial w}{\partial y}\frac{\partial y}{\partial r} + \frac{\partial w}{\partial z}\frac{\partial z}{\partial r}$$
$$\frac{\partial w}{\partial s} = \frac{\partial w}{\partial x}\frac{\partial x}{\partial s} + \frac{\partial w}{\partial y}\frac{\partial y}{\partial s} + \frac{\partial w}{\partial z}\frac{\partial z}{\partial s}$$
$$\frac{\partial w}{\partial t} = \frac{\partial w}{\partial x}\frac{\partial x}{\partial t} + \frac{\partial w}{\partial y}\frac{\partial y}{\partial t} + \frac{\partial w}{\partial z}\frac{\partial z}{\partial t}$$

Vector Gradiente,

$$\nabla f(x, y, z) = \left(\frac{\partial f}{\partial x}\right)\hat{i} + \left(\frac{\partial f}{\partial y}\right)\hat{j} + \left(\frac{\partial f}{\partial z}\right)k$$

Derivada Direccional

$$D_{\hat{u}} f(x, y, z) = \nabla f(x, y, z) \circ \hat{u}$$

Ecuación del Plano Tangente

$$Si \quad z = f(x, y)$$
$$z - z_0 = f_x(x_0, y_0)(x - x_0) + f_y(x_0, y_0)(y - y_0)$$

Máximos y Mínimos

$$f_x = 0 \; ; \; f_y = 0 \Rightarrow puntos\,críticos$$
$$D = f_{xx} f_{yy} - [f_{xy}]^2$$
$$D \begin{cases} > 0 & f_{xx} \begin{cases} < 0 & máximo \\ > 0 & mínimo \end{cases} \\ < 0 & punto\,silla \end{cases}$$

Coordenadas Cilíndricas

$$x = r\cos\theta$$
$$y = rsen\theta$$
$$z = z$$
$$dV = dz(rdrd\theta)$$
$$r^2 = x^2 + y^2$$

Coordenadas Esféricas

$$x = \rho\cos\theta sen\phi$$
$$y = \rho sen\theta sen\phi$$
$$z = \rho\cos\phi$$
$$dV = \rho^2 sen\phi d\rho d\theta d\phi$$
$$\rho^2 = x^2 + y^2 + z^2$$