Fórmulas del Examen Final de Matemáticas para Ingeniería III
Semestre AD2018

Regla de la Cadena:

$w=(x,y,z)$; $x=f(r,s,t)$;

$y=g(r,s,t)$; $z=h(r,s,t)$

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

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

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

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

$$D=f_{xx}f_{yy}-\left[f_{xy}\right]^2$$

$$D>0 \ y \ f_{xx}\begin{cases}<0 \ máximo\\ >0 \ mínimo\end{cases}$$

$D<0$ *punto silla*

$D=0$ *no se sabe*

Coordenadas Cilíndricas

$x=r\cos\theta$

$y=r sen\theta$

$z=z$

$dV=dz(r dr d\theta)$

$r^2=x^2+y^2$

Coordenadas Esféricas

$x=\rho\cos\theta\, sen\varphi$

$y=\rho\, sen\theta\, sen\varphi$

$z=\rho\cos\varphi$

$dV=\rho^2 sen\varphi\, d\rho\, d\theta\, d\varphi$

$\rho^2=x^2+y^2+z^2$

Multiplicadores de Lagrange

$$f_x=\lambda g_x \ ; \ f_y=\lambda g_y \ ; \ f_z=\lambda g_z$$

Teorema de Stokes

$$\oint_C \vec{F}\bullet d\vec{r}=\iint_S rot\,\vec{F}\bullet d\vec{S}=\iint_D rot\,\vec{F}\bullet\vec{n}\,dA$$

$\vec{F}=\langle P,Q,R\rangle$

$S: z=g(x,y)\,;\,\vec{n}=\langle -g_x,-g_y,1\rangle$

$$rot\,\vec{F}=\begin{vmatrix} i & j & k\\ \partial/\partial x & \partial/\partial y & \partial/\partial z\\ P & Q & R\end{vmatrix}$$

Plano: $ax+by+cz=d$

Esfera: $x^2+y^2+z^2=r^2$

Cono: $z^2=x^2+y^2$

Paraboloide: $z=x^2+y^2$

Teorema de Gauss

$$Flujo=\oiint_S \vec{F}\bullet\vec{n}\,dS=\iiint_V div\,\vec{F}\,dV$$

$$div\,\vec{F}=\partial P/\partial x+\partial Q/\partial y+\partial R/\partial z$$