$$\frac{\partial G}{\partial y} = \frac{\partial G}{\partial x}\frac{\partial x}{\partial u} + \frac{\partial G}{\partial y}\frac{\partial y}{\partial u}$$

$G = \cos y\, e^{7x}$ $x = 2u+5v$ & $y = 3u-2v$

$$\boxed{\frac{\partial G}{\partial y} = -\sin y\, e^{7x}}$$

$$\frac{\partial G}{\partial y} = -\sin(3u-2v)\, e^{7(2u+5v)}$$

$$G(u,v) = G = \cos(3u-2v)\, e^{7(2u+5v)}$$

Implicit Differentiation $F(x,y) = 0$ $\frac{dy}{dx} = \frac{-F_x}{F_y}$

$G(x,y,z) = 0$ $\frac{\partial y}{\partial x} = \frac{-G_x}{G_y}$

Ex $F = x\cos y - \sin x + y^2 =$

$\frac{dy}{dx} = \frac{-F_x}{F_y} = \frac{-(\cos y - \cos}{-x\sin y + 2y}$

$0 = dF = F_x dx + F_y dy$

$F(x,y,z) = 0$ at (x_0, y_0, z_0) Tangent Plane

$$F_x^{(x_0,y_0,z_0)}(\underline{x}-x_0) + F_y^{(x_0,y_0,z_0)}(\underline{y}-y_0) + F_z^{(x_0,y_0,z_0)}(\underline{z}-z_0) = 0$$

$$\frac{-F_x dx}{F_y dx} = \frac{F_y dy}{F_y dx}$$

$$\frac{-F_x}{F_y} = \frac{dy}{dx}$$

$z^2 + F(x,y) = 0$

$2z_0(z-z_0)$

$Ax + By + Cz = $

Ex $\iint \underbrace{xy^2 + \sin x \, dx}_{\text{consider } y \text{ as constant}} dy = F(x,y) \quad dA$

$$\int \left[\frac{x^2}{2} y^2 - \cos x + \cancel{C}\right] d\cancel{y}$$

$$\left[\frac{x^2 y^3}{2\cdot 3} - y\cos x + \cancel{C_1 y} + C_2\right]$$

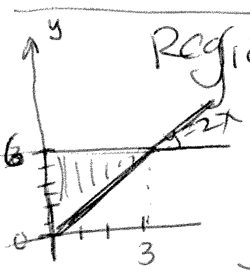
consider x as constant

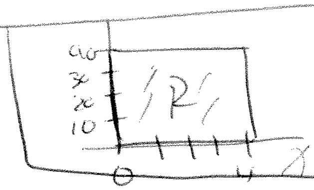
$\iint xy^2 + \sin x \, dy\, dx$

$\int \left[\frac{xy^3}{3} + y\sin x + C\right]$

$\frac{x^2y^3}{2\cdot 3} - y\cos x + \cancel{C_1 x} +$

Regions





$$\iint_R f(x,y)\, dA = \int_{y=0}^{40}\int_{x=0}^{4} f(x,y)\, dx\, dy$$

$$\int_{x=0}^{3}\int_{y=2x}^{y=6} f(x,y)\, dy =$$

$$\int_{x=0}^{4}\int_{y=0}^{40} f(x,y)\, dy\, dx = \text{Volume}$$