$$W = f(x,y) = 2xy + y^3 \qquad x_0 = 1 \quad y_0 = -2$$

$$\frac{\partial f}{\partial x}\bigg|_{x_0,y_0} = 2y \qquad \frac{\partial f}{\partial y}\bigg|_{x_0,y_0} = 2x + 3y^2$$

$$= -4 \qquad = 2\cdot 1 + 3(-2)^2 = 14$$

$$W_0 = 2(1)(-2) + (-2)^3 = -4 + (-8) = -12$$

$$W - W_0 = \frac{\partial f}{\partial x}(x - x_0) + \frac{\partial f}{\partial y}(y - y_0) = -4(x-1) + 14(y+2)$$

$$W_{lin} = -12 - 4(x-1) + 14(y+2)$$

$$\left|\frac{W_{lin} - W}{W}\right| \leq 0.05 \qquad W_{lin} - W = .05W$$

$$W_{lin} - W = -0.05W$$

$$W_{lin} - W = -12 - 4(x-1) + 14(y+2) - \left(2xy + y^3\right) = 0.05\left(2xy + y^3\right)$$

$$\text{let } y = -2$$