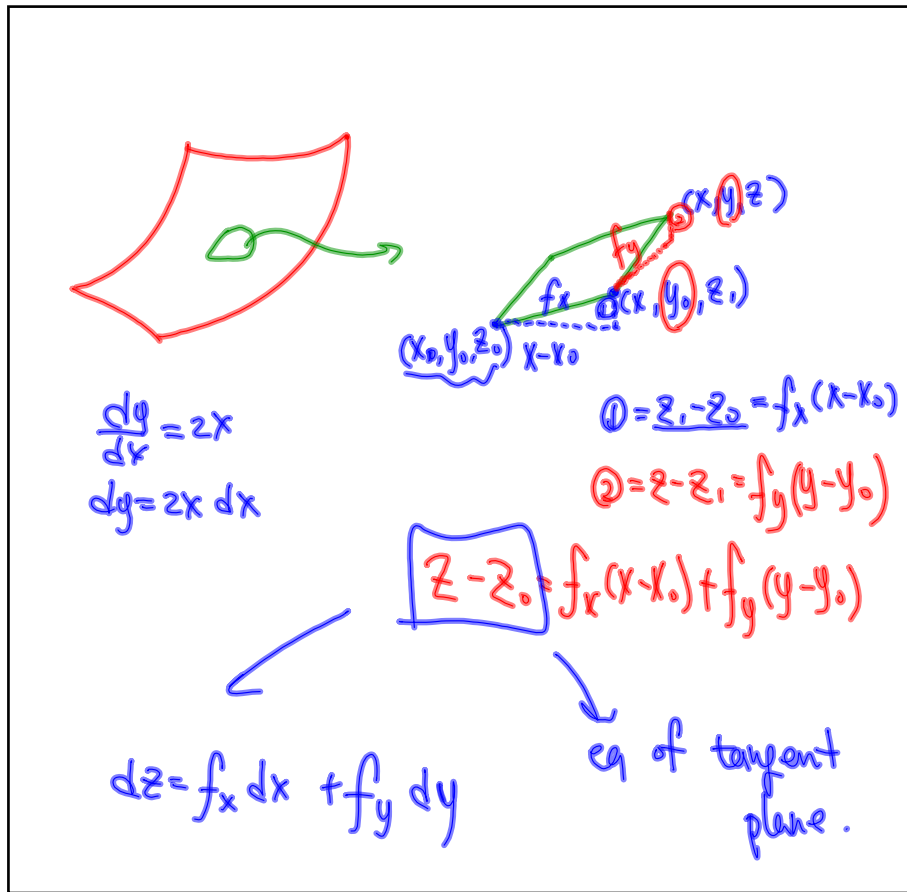




$$x^2 + y^2 + z^2 = 1 \quad @ \quad \underline{\left(\frac{1}{2}, \frac{1}{2}, \frac{\sqrt{2}}{2}\right)}$$

$$z = \sqrt{1 - x^2 - y^2}$$

$$f_x = \frac{1}{2\sqrt{1-x^2-y^2}} \cdot -2x = -\frac{x}{\sqrt{1-x^2-y^2}} \quad f_y = \frac{1}{2\sqrt{1-x^2-y^2}} \cdot -2y = -\frac{y}{\sqrt{1-x^2-y^2}}$$

$$z - \frac{\sqrt{2}}{2} = \frac{-x}{\sqrt{1-x^2-y^2}} \left(x - \frac{1}{2}\right) - \frac{y}{\sqrt{1-x^2-y^2}} \left(y - \frac{1}{2}\right)$$

$$z - \frac{\sqrt{2}}{2} = -\frac{\sqrt{2}}{2} \left(x - \frac{1}{2}\right) - \frac{\sqrt{2}}{2} \left(y - \frac{1}{2}\right)$$

tangent plane.

$$6. z = e^{x^2-y^2}, \quad (1, -1, 1)$$

$$f_x = 2x \cdot e^{x^2-y^2}$$

$$f_y = -2y \cdot e^{x^2-y^2}$$

$$z-1 = 2x_0 e^{x_0^2-y_0^2}(x-1) + -2y_0 e^{x_0^2-y_0^2}(y+1)$$

$$z-1 = 2(x-1) + 2(y+1)$$

32. If $z = x^2 - xy + 3y^2$ and (x, y) changes from $(3, -1)$ to $(2.96, -0.95)$, compare the values of Δz and dz .

$$f_x = 2x - y = 7$$

$$f_y = -x + 6y = -9$$

$$z-15 = 7(x-3) - 9(y+1)$$

$$* z-15 = 7(-.04) - 9(.05)$$

$$z = 15 - .28 - .45 = \boxed{14.27}$$