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$l =$ $.02$ $1.6 \pm .01$

$Vol = \pi r^2 \cdot h$

$Error \ Vol = D = 2\pi r h \, dr \, i + \pi r^h \, dh \, j$

$$2\pi (1)(1.6)(.02)i + \pi(1)(.01)j$$
$$0.201062 \, i + 0.0314159$$

$Volumen \ cono = 2\pi(1)^h (1.6) = 10.05$

$Error = \left(\dfrac{0.201062}{10.05} i + \dfrac{0.031459}{10.05} j \right) 100$

$Error = (2.006 \, i + 0.3130 \, j) \, \%$

2.-

$$\triangle = 2xi - 6yj - 2zk \qquad P(4, -1, 3)$$

$$4(4)i - 6(-1)j - 2(3)k$$

$$\nabla = 16i + 6j - 6k$$

$$16(x-4) + 6(y+1) - 6(z-3)$$

$$16x - 64 + 6y + 6 - 6z + 18$$

$$16x + 6y - 6z - 40 = 0 \quad \text{plano}$$

$$\frac{x-4}{16} = \frac{(y+1)}{6} = \frac{z-3}{-6} \quad \text{recta}$$

3.-

$$f(x,y) = x^3 + 3xy + y^3$$

$$f_x = 3x^2 + 3y \qquad 3x^2 + 3y = 0 \qquad 3y^2 + 3x = 0$$
$$f_y = 3y^2 + 3x \qquad 3x^2 = -3y \qquad 3(-x^2)^2 + 3x = 0$$
$$f_{xy} = 6x \qquad\qquad x^2 = -y \qquad 3x^4 + 3x = 0$$
$$f_{yy} = 6y \qquad\qquad -x^2 = y \qquad 3x(x^3 + 1) = 0$$
$$f_{xy} = 3 \qquad\qquad\qquad\qquad x = 0 \qquad x = \sqrt[3]{1}$$

Puntos criticos $\qquad\qquad\qquad\qquad\qquad x = 1$

$$y_1 = -(0)^2 = 0 \qquad DP_2 = 6(1) - 3^2 = 36 - 9 = 27 \quad f_{xx} + \text{es minimo } (1,1)$$
$$y_2 = (1)^2 = 1 \qquad DP_1 = 0(0) - 3^2 = -9 \quad \text{silla}$$
$$P_1 = (0,0)$$
$$P_2 = (1,1)$$

4:

$dx = 4y - 2x\wedge$

$dy = 4x - \dfrac{y\wedge}{2}$

$d\wedge = -x^2 - \dfrac{y^2}{4} + 1$

$-2\dfrac{y}{2} = -4x$

$x = -8x$

$x = \dfrac{8x}{y}$

$4y - 2x\wedge = 0$

$4y - 2x\left(\dfrac{8x}{2}\right)$

$4y - \dfrac{16x^2}{y} = 0$

$4y^2 - 16x^2 = 0$

$y^2 - 4x^2 = 0$

$-4x^2 - y^2 = -4 \quad (-1)$

$-4x^2 + y^2 = 0$
_____

$4x^2 + y^2 = 4$

$-4x^2 + y^2 = 0$

$2y^2 = 4$

$y = \pm\sqrt{2}$

$y^2 = 4x^2$

$2 = 4x^2$

$\dfrac{1}{2} = x^2$

$\sqrt{1/2} = x^2$

$\pm\dfrac{1}{\sqrt{2}} = x$

$Ponto_1\left(\dfrac{1}{\sqrt{2}}, \sqrt{2}\right)$

$Ponto_2 = \left(-\dfrac{1}{\sqrt{2}}, -\sqrt{2}\right)$

$Ponto_3 = \left(-\dfrac{1}{\sqrt{2}}, \sqrt{2}\right)$

$Ponto_4 = \left(\dfrac{1}{\sqrt{2}}, -\sqrt{2}\right)$