1. $43x^2 + 21y^2 + 19z\cos(z) = 0$

$Zy = \dfrac{\partial z}{\partial y} = \dfrac{-fy}{fz} = \dfrac{-42y}{19\cos(z) - 19z\,\text{sen}z}$

$fy = 42y \; ; \; fz = 19\cos(z) - 19z\,\text{sen}z$

$Zy(x,y,0) = \dfrac{-42y}{19\cos(0)} = \dfrac{-42}{19}y = 0x + \dfrac{-42}{19}y$

$100a + b = 100(0) + \dfrac{-42}{19} = -2.2105$

2. $n_1, n_2, n_2 + n_1, n_1 + 2n_2, 2n_1 + 3n_2$

$2n_1 + 3n_2 = 6262622$

Si $n_2 = 0$

$\quad 2n_1 = 6262622$

$\quad n_1 = 3131311$

$3131311, 0, 3131311, 3131311, 6262622$

Si $n_2 = 1$:C

$2n_1 + 3 = 6262622$

Si $n_2 = 2$

$2n_1 + 6 = 6262622$

$n_1 = 3131308$

4. $f(x,y) = 4xy \; ; \; 16x^2 + 9y^2 = 144$

máximo en $(\sqrt{2}\,a, \sqrt{2}\,b); \; a > 0, \; b > 0$

$\nabla f(4y, 4x) = \lambda(32x, 18y)$

$\begin{cases} 4y = 32\lambda x \\ 4x = 18\lambda y \\ 16x^2 + 9y^2 = 144 \end{cases}$

$\rightarrow y = 8\lambda x$

$\rightarrow 4x = 18\lambda(8\lambda x) \rightarrow x = 36\lambda^2 x$

$36\lambda^2 x - x = 0$

$x(36\lambda^2 - 1) = 0$

$x = 0 \quad \vee \quad \lambda^2 = \dfrac{1}{36}$

$\lambda = \pm\dfrac{1}{6}$

Si $x = 0$: ③ $9y^2 = 144$

$\quad y^2 = 16$

$\quad y = \pm 4$

$100\left(\dfrac{3}{2}\right) + 2 = 152$

Si $\lambda = \pm\dfrac{1}{6}$: ② $y = \dfrac{4}{3}x$

① $2x = 9\left(\dfrac{\pm 1}{6}\right)\left(\dfrac{4}{3}x\right)$

$\sqrt{2}\,a = 3/\sqrt{2} \qquad b\sqrt{2} = 2\sqrt{2} \qquad \max(x,y) = \left(\dfrac{3}{\sqrt{2}}, 2\sqrt{2}\right)$

$2a = 3 \qquad\qquad b = 2$

$a = \dfrac{3}{2}$

5. $f(x,y) = \dfrac{38x^3y^3}{83x^{12}+56y^4}$ $x = r\cos\theta, \quad y = r\sin\theta$

$\lim\limits_{x\to 0} f(x,0) = \dfrac{0}{83x^{12}} = \dfrac{0}{12.83x} = 0 = a$

$\lim\limits_{x\to 0} \dfrac{38x^3 x^9}{83x^{12}+56x^{12}} = \dfrac{38x^{12}}{139x^{12}} = \dfrac{38}{139} = 0.2733 = b$

c) $f(x,y) \rightarrow$ No existe

$100(0) + \dfrac{380}{139} + 2'000,000$

Si $x\to 0 \Rightarrow f\to 0$

Si $y\to x = \dfrac{38x^3 x^3}{83x^{12}+56x^4} = \dfrac{38x^2}{83x^8+56} \rightarrow 0$

6. Direccional de $f(x,y) = 4x^4 + 9x^2y$ en $(6,7)$ dir $= \langle 7,3\rangle$

$\nabla F = (16x^3 + 18xy, \ 9x^2)$

$\nabla F(6,7) = (4212, 324),$ $v = (7,3) \rightarrow |v| = \left(\dfrac{7}{\sqrt{58}}, \dfrac{3}{\sqrt{58}}\right)$

Direccional $= (4212, 324) \cdot \left(\dfrac{7}{\sqrt{58}}, \dfrac{3}{\sqrt{58}}\right) = \left(\dfrac{29484}{\sqrt{58}} + \dfrac{972}{\sqrt{58}}\right)$

$= \dfrac{30456}{\sqrt{58}} = 3999.069$

7. $f(x,y,z) = x^6 + y^7 + z^8.$

$f_z = 8z^7$

$f_z(1,1,3) = 17496$

8. $H = \begin{vmatrix} -9, & -3 \\ -3, & -7 \end{vmatrix}$
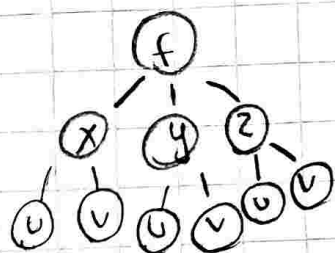
$\det|H_1| = -9$, $\det|H_2| = 63 - 9 = 54$

9. $f(x,y,z) = 2x + 5y + 3z^2$;

$x = 6u + 8v$

$F_u = F_x x_u + F_y y_u + F_z z_u$ $\qquad y = 9u - 8v$

$z = 3uv$

$= (2(6)) + (5)(9) + (6z\,3v)$

$= 12 + 45 + 18zv$

$= 57 + 18\,z_{(4,8)}\,8 = 57 + 144(3(4)(8)) = 13881$

10. Plano tangente $f(x,y) = x^9 + y^6$

$425(x-a) + 314(y-b) - (z-c) = 0$

$\quad f_x(a,b)(x-a) + f_y(a,b)(y-b) - (z-c) = 0$

$f_x = 9x^8 \rightarrow f_x(a) = 425 \rightarrow a = \sqrt[8]{\frac{425}{9}}$

$f_y = 6y^5 \rightarrow b = \sqrt[5]{\frac{314}{6}}$

$100a + b = 100\sqrt[8]{\frac{425}{9}} + \sqrt[5]{\frac{314}{6}} = 164.115$

11. $f_x = \ln(\overset{a}{\hat{a}}x \,\overset{b}{\&}\, y) + \ln(\overset{c}{\heartsuit}x \,\overset{d}{\diamond}\, y)$ $\qquad \ln a \rightarrow a \geq 0$

$\quad axby > 0 \qquad\qquad cxby > 0$

$\quad$ por de negativos $\qquad$ por de negativos

12. $f(x) = x^2 + ay^2 + by$ hipérbola con centro fuera del origen

$\quad K = x^2 + ay^2 + by$