1- a) $DomF = \{(x,y) \in \Re^2 / 25 - x^2 - y^2 \geq 0 \wedge x - y \neq 0\}$

b) $DomF = \{(x,y) \in \Re^2 / 9 - x^2 - y^2 \geq 0\}$

c) $DomF = \{(x,y) \in \Re^2 / \frac{x^2}{4} + \frac{y^2}{25} - 1 > 0\}$

d) $DomF = \{(x,y) \in \Re^2 / x + 5y > 0\}$

e) $DomF = \{(x,y) \in \Re^2 / x - 2y - 4 > 0 \wedge \frac{x^2}{4} - \frac{y^2}{16} - 1 \neq 0\}$

f) $DomF = \{(x,y) \in \Re^2 / x^2 + y > 0\}$

g) $DomF = \{(x,y) \in \Re^2\}$

h) $DomF = \{(x,y) \in \Re^2 / x^2 - 1 \neq 0\}$

i) $DomF = \{(x,y) \in \Re^2 / x + y - 4 \neq 0\}$

j) $DomF = \{(x,y) \in \Re^2 / 2x + y > 0 \wedge 1 - x^2 - y^2 \geq 0\}$

k) $DomF = \{(x,y) \in \Re^2 / 9 - 2x - 3y \geq 0\}$

l) $DomF = \{(x,y) \in \Re^2 / 16 - x^2 + 4y^2 > 0\}$

2- a) $C_{-2} = \{\}$

$C_{-1} = \{(x,y) = (0,0)\}$

$C_0 = \{(x,y) \in DomF / x^2 + y^2 = 1\}$

$C_1 = \{(x,y) \in DomF / x^2 + y^2 = 2\}$

$C_2 = \{(x,y) \in DomF / x^2 + y^2 = 3\}$

$C_3 = \{(x,y) \in DomF / x^2 + y^2 = 4\}$

b) $C_{-2} = C_{-1} = \{\}$

$C_0 = \{(x,y) \in DomF / x^2 + y^2 = 36\}$

$C_1 = \{(x,y) \in DomF / x^2 + y^2 = 35\}$

$C_2 = \{(x,y) \in DomF / x^2 + y^2 = 32\}$

$C_3 = \{(x,y) \in DomF / x^2 + y^2 = 27\}$

c) $C_{-2} = \{(x,y) \in DomF / y = -\frac{1}{x}\}$

$C_{-1} = \{(x,y) \in DomF / y = -\frac{1}{2x}\}$

$C_0 = \{(x,y) \in DomF / y = 0 \wedge x = 0\}$

$C_1 = \{(x,y) \in DomF / y = \frac{1}{2x}\}$

$C_2 = \{(x,y) \in DomF / y = \frac{1}{x}\}$

$C_3 = \{(x,y) \in DomF / y = \frac{3}{2x}\}$

d) $C_{-2} = C_0 = C_1 = C_2 = C_3 = \{\}$ $C_{-1} = \Re^2$

e) $C_{-2} = \{(x,y) \in DomF / y = -\frac{1}{2}x^2 - 2\}$

$C_{-1} = \{(x,y) \in DomF / y = -x^2 - 3\}$

$C_0 = \{\}$

$C_1 = \{(x,y) \in DomF / y = x^2 + 1\}$

$C_2 = \{(x,y) \in DomF / y = \frac{1}{2}x^2\}$

$C_3 = \{(x,y) \in DomF / y = \frac{1}{3}x^2 - \frac{1}{3}\}$

f) $C_{-2} = \{(x,y) \in DomF / y = -2x^2 - 1\}$

$C_{-1} = \{(x,y) \in DomF / y = -x^2\}$

$C_0 = \{(x,y) \in DomF / y = 1\}$

$C_1 = \{(x,y) \in DomF / y = x^2 + 2\}$

$C_2 = \{(x,y) \in DomF / y = 2x^2 + 3\}$

$C_3 = \{(x,y) \in DomF / y = 3x^2 + 4\}$

g) $C_{-2}=\{(x,y)\in DomF\,/\,y=-x-2\}$

$C_{-1}=\{(x,y)\in DomF\,/\,y=-x-1\}$

$C_{0}=\{(x,y)\in DomF\,/\,y=-x\}$

$C_{1}=\{(x,y)\in DomF\,/\,y=-x+1\}$

$C_{2}=\{(x,y)\in DomF\,/\,y=-x+2\}$

$C_{3}=\{(x,y)\in DomF\,/\,y=-x+3\}$

h) $C_{-2}=C_{-1}=\{\}$

$C_{0}=\{(x,y)\in DomF\,/\,y=-x-1\}$

$C_{1}=\{(x,y)\in DomF\,/\,y=-x\}$

$C_{2}=\{(x,y)\in DomF\,/\,y=-x+3\}$

$C_{3}=\{(x,y)\in DomF\,/\,y=-x+8\}$

i) $C_{-2}=\{(x,y)\in DomF\,/\,y=-x-\frac{1}{2}\}$

$C_{-1}=\{(x,y)\in DomF\,/\,y=-x\}$

$C_{0}=\{\}$

$C_{1}=\{(x,y)\in DomF\,/\,y=-x\}$

$C_{2}=\{(x,y)\in DomF\,/\,y=-x+\frac{1}{2}\}$

$C_{3}=\{(x,y)\in DomF\,/\,y=-x+\frac{1}{3}\}$

j) $C_{-2}=\{(x,y)\in DomF\,/-\frac{x^2}{2}+\frac{y^2}{2}=1\}$

$C_{-1}=\{(x,y)\in DomF\,/-x^2+y^2=1\}$

$C_{0}=\{(x,y)\in DomF\,/\,y=x\wedge y=-x\}$

$C_{1}=\{(x,y)\in DomF\,/\,x^2-y^2=1\}$

$C_{2}=\{(x,y)\in DomF\,/\,\frac{x^2}{2}-\frac{y^2}{2}=1\}$

$C_{3}=\{(x,y)\in DomF\,/\,\frac{x^2}{3}-\frac{y^2}{3}=1\}$

3- a) $DomF=\{(x,y)\in\Re^2\,/\,1-x^2-y^2\geq 0\wedge x+2y+1\geq 0\}$

b) $C_{\frac{5}{2}}$

4- a) $F_x=-9$ es la pendiente de la Recta Tangente en $(2;-3;6)$ a la Curva que queda determinada por la intersección de la gráfica de F con el plano vertical $y=-3$

$F_y=-2$ es la pendiente de la Recta Tangente en $(2;-3;6)$ a la Curva que queda determinada por la intersección de la gráfica de F con el plano vertical $x=2$

b) $F_x=22 \quad F_y=-10$

c) $F_x=F_y=-\frac{1}{16}$

5- a) $F_x=2xy+\cos x$

$F_y=x^2+3.sen(3y)$

b) $F_x=-\frac{y^2}{x^2}+2^{xy}.\ln 2.y$

$F_y=\frac{2y}{x}+2^{xy}.\ln 2.x$

c) $F_x=\frac{1}{2.\sqrt{\ln(3x-y)}}.\frac{3}{3x-y}+2.x.e^{x^2}$

$F_y=\frac{1}{2.\sqrt{\ln(3x-y)}}.\frac{-1}{3x-y}-\frac{3}{2}.\sqrt{y}$

d) $F_x=\frac{1}{2}.e^{\frac{xy}{z}}.\frac{y}{z}+z.\cos(xz)$

$F_y=\frac{1}{2}.e^{\frac{xy}{z}}.\frac{x}{z}$

$F_z=\frac{1}{2}.e^{\frac{xy}{z}}.(-\frac{xy}{z^z})+x.\cos(xz)$

e) $F_x = 4.\sqrt{x^2+y^2} + \dfrac{4x^2}{\sqrt{x^2+y^2}}$

$F_y = 8y + \dfrac{4xy}{\sqrt{x^2+y^2}}$

f) $F_x = \dfrac{(2x.e^{xy+y^2} + x^2.e^{xy+y^2}.y)(2y+x^2) - x^2.e^{xy+y^2}.2x}{(2y+x^2)^2}$

$F_y = \dfrac{x^2.e^{xy+y^2}.(x+2y)(2y+x^2) - x^2.e^{xy+y^2}.2}{(2y+x^2)^2}$

g) $F_x = -\dfrac{5}{2}.(x^2+y^2+z^2)^{-\frac{3}{2}}.2x$

$F_y = -\dfrac{5}{2}.(x^2+y^2+z^2)^{-\frac{3}{2}}.2y$

$F_z = -\dfrac{5}{2}.(x^2+y^2+z^2)^{-\frac{3}{2}}.2z$

h) $F_x = \dfrac{(\frac{3}{2\sqrt{x}}.e^{\frac{y}{x}} + 3.\sqrt{x}.e^{\frac{y}{x}}.(-\frac{y}{x^2})).(3y^2+2x^3) - 3\sqrt{x}.e^{\frac{y}{x}}.6x^2}{(3y^2+2x^3)^2}$

$F_y = \dfrac{3.\sqrt{x}.e^{\frac{y}{x}}.\frac{1}{x}.(3y^2+2x^3) - 3\sqrt{x}.e^{\frac{y}{x}}.6y}{(3y^2+2x^3)^2}$

i) $F_x = 4.yz.x^{y-1} + \dfrac{2z}{x}$

$F_y = 4z..x^y.\ln(x) - \dfrac{z}{y}$

$F_z = 4..x^y + \ln(\dfrac{x^2}{y})$

j) $F_x = \dfrac{2(x-y).(x+y) - (x-y)^2}{(x+y)^2} - (3y-1)^{2x^3+4}.\ln(3y-1).6x^2$

$F_y = \dfrac{-2(x-y).(x+y) - (x-y)^2}{(x+y)^2} - (2x^3+4).3.(3y-1)^{2x^3+3}$

6- a) $\nabla F(\pi;1) = (2;\ \pi.\ln\pi + \pi)$

b) $\nabla F(1;2) = (2;\ 4)$

c) $\nabla F(1;1;0) = (0;\ 0;\ 1)$

7- a) $F_x = 3x^2y^2 + y.x^{y-1}$ $\quad F_{xx} = 6xy^2 + y.(y-1).x^{y-1}$ $\quad F_{xy} = 6x^2y + x^{y-1} + y.x^{y-1}.\ln x$

$F_x = 2x^3y + x.\ln x$ $\quad F_{yy} = 2x^3 + x.(\ln x)^2$

b) $F_x = e^y - 2xsen\,(xy) - x^2y.\cos\,(xy)$ $\quad F_{xx} = -2sen\,(xy) - 4xy.\cos\,(xy) + x^2y^2.sen\,(xy)$

$F_y = x.e^y - x^3.\cos\,(xy)$ $\quad F_{yy} = x.e^y + x^4.sen(xy)$

$F_{xy} = e^y - 3.x^2.\cos(xy) + x^3.y.sen\,(xy)$

8- a) $\Delta F(1;2) = 8\Delta x + 3\Delta y + 3\Delta x.\Delta y + (\Delta x)^2$

$dF(1;2) = 8\Delta x + 3\Delta y$

b) $\Delta F(P_0) = (6x_0 - y_0)\Delta x + (4y_0 - x_0)\Delta y + 3(\Delta x)^2 - \Delta x.\Delta y + 2(\Delta y)^2$

$dF(P_0) = (6x_0 - y_0)\Delta x + (4y_0 - x_0)\Delta y$

9- a) $dF(P;\,\Delta x;\,\Delta y) = (2x + 3x^2y^3.\cos\,(x^3.y))\Delta x + (2y.sen\,(x^3y) + y^2x^3\cos\,(x^3y))\Delta y$

b) $dF(P;\,\Delta x;\,\Delta y) = (\frac{1}{y^2} + \frac{1}{x})\Delta x + (-\frac{2x}{y^3} + \frac{1}{y})\Delta y$

c) $dF(P;\,\Delta x;\,\Delta y) = (y^3.\cos\,(x.y^2) + \frac{1}{y}.x^{\frac{1}{y}-1})\Delta x + (sen\,(xy^2) + 2y^2x\cos\,(xy^2) - \frac{1}{y^2}x^{\frac{1}{y}}.\ln x)\Delta y$

d) $dF(P;\,\Delta x;\,\Delta y) = (e^y + \frac{1}{x})\Delta x + (1 + x.e^y)\Delta y$

10- a) 1.06 b) 5.42

11- a) $z_t = -1$ b) $z_t = -2 + 2.(x-1) + 2.(y+1)$ c) $z_t = \frac{9}{5} + \frac{48}{125}.(x-3) - \frac{36}{125}.(y-4)$

a) -1 b) -1.94 c) 1.75872

12- $dF(-1;\,2;\,\Delta x;\,\Delta y) = -4\Delta x + \Delta y$

13- $z_t = 5 + 4.(x+1) - 4.(y-1)$

14-a) $P_2(x,y) = 1 + 5.(x-1) + 1.(y+2) + 11.(x-1)^2 + 5(x-1)(y+2) + \frac{1}{2}(y+2)^2$

b) $P_2(x,y) = 1 + \ln 2.(y-1) + \frac{1}{2}x(y-1) + \frac{1}{2}\ln^2 2(y-1)^2$

c) $P_2(x,y) = 2.(x-1) - (x-1)^2 + (x-1)(y-2)$

15- a) $P_2(x,y) = x.y$

b) $P_2(x,y) = 1 + x + y + \frac{1}{2}x^2 + x.y + \frac{1}{2}y^2$

c) $P_2(x,y) = x + y$

16- a) $P_2(x,y) = 1 + 3.(x-1) - (y+1) + 3.(x-1)^2 - 5(x-1)(y+1) + (y+1)^2$

b) $P_2(x,y) = 260 + 30.(x-2) - 240.(y+3) + 6.(x-2)^2 - 12.(x-2)(y+3) + 76.(y+3)^2$

17- a) 0.6581 b) 0.99796

18- a) $P_2(x,y) = 9 + 6.(x-3) + 9.y + (x-3)^2 + \frac{9}{2}.(x-3).y$

b) 12.44

19- a) Punto de Ensilladura $(0,0,F(0,0))$

Mínimo Relativo en $(\frac{1}{2},-\frac{1}{4})$

b) Mínimo Relativo en $(1,-2)$

c) Punto Crítico en $(0,0)$

d) Punto de Ensilladura $(0,1,F(0,1))$

Punto de Ensilladura $(0,-1,F(0,-1))$

e) Máximo Relativo en $(0,0)$

f) Puntos Críticos en $(1,0)$ y $(-1,0)$

g) Puntos de Ensilladura $(1,0,F(1,0))$ y $(2,0,F(2,0))$
Mínimos Relativos en $(1,1)$ y $(2,1)$

20- a) Mínimo Relativo en $(0,0)$

21- a) Máximo Relativo $F(2,2)=4$ b) Máximo Relativo $F(\sqrt{2},0)=F(-\sqrt{2},0)=1$

Mínimo Relativo $F(0,1)=F(0,-1)=\dfrac{1}{2}$

c) Mínimo Relativo $F(6,9)=612$

22- $P=(6,3)$ $Z_t=-\dfrac{1}{4}(y-3)-3$

23- a) $(g\circ F)=e^{-2x^3-2xy}.sen\,(x^3+xy)$ $(F\circ g)$ No es posible

b) $(G\circ f)=(sen\,t^{\frac{3}{2}}+\ln t;\ \dfrac{t^{\frac{3}{2}}}{\ln t};\ \sqrt{t})$ $(f\circ G)$ No es posible

c) $(h\circ G)=((2x+y+z)^2;\ 4x+2y+2z;\ 2x+y+z-1)$
$(G\circ h)=2t^2+3t-1$

24- $h'(t)=5+10t$

25- a) $h'(-3)=1863$
b) $h'(2)=\ln 2-\dfrac{1}{4}$

26- a) $\dfrac{\partial H}{\partial s}=3s^2-10st+5t^2+t$ $\dfrac{\partial H}{\partial t}=-5s^2+10st-3t^2+s$

b) $\dfrac{\partial H}{\partial s}=300s+120t+15s^2+14st-10t^2s-7t^3+2t^2$

$\dfrac{\partial H}{\partial t}=120s+48t+7s^2+4ts-21t^2s+8t^3-10ts^2$

27- a) $\nabla H(1;\,0)=(\dfrac{8}{9};\dfrac{4}{3})$ b) $Z_t=\dfrac{8}{9}(x-1)+\dfrac{4}{3}y+\dfrac{4}{3}$ c) $H(1{,}01;\,0{,}02)\cong 1{,}368$

28- a) $n=2$ b) $n=1$ c) No es homogénea d) $n=0$ e) No es homogénea f) $n=2$

29- $C_2=\{(x,y)\in DomF\,/\,y=x^2-2\}$

30- a) $F_z(1,1,0)=0$ No se verifican las condiciones de existencia

b) $Z_x(1,-2)=\dfrac{7}{13}$ $Z_y(1,-2)=\dfrac{5}{13}$

31- $X_y(1,2)=-\dfrac{11}{4}$

32- a) $F_x=y.e^{xy}+senx-3$ $F_y=x.e^{xy}$ $F_z=6z-4$

b) $F_x = 2y^2 + e^y + y.e^x - yz$ $\quad F_y = 4xy + x.e^y + e^x - xz$ $\quad F_z = -xy$

c) $X_y = -3 \quad X_z = -2 + \frac{1}{z}$ $\quad Y_x = -\frac{1}{3} \quad Y_z = \frac{-2 + \frac{1}{z}}{3}$ $\quad Z_x = \frac{-1}{2 - \frac{1}{z}} \quad Z_y = \frac{-3}{2 - \frac{1}{z}}$

33- $dz(2,0) = -8\Delta x + 16\Delta y$