1. $f : \mathbb{R}^2 \to \mathbb{R} \wedge f \in C^2$

   $P_2(x,y) = 2x^2 - xy + 5x - y + 5$ en $(-1,1) = g(x,y)$

   $P_2(x,y) = f(a,b) + f_x(a,b)(x+1) + f_y(a,b)(y-1) + \frac{f_{xx}(a,b)(x+1)^2}{2} + \frac{f_{yy}(a,b)(x-1)^2}{2} + f_{xy}(a,b)(x+1)(y-1)$

   - $g_x(x,y) = 4x - y + 5$
   - $g_y(x,y) = -x - 1$
   - $g_{xx}(x,y) = 4$
   - $g_{xy}(x,y) = -1$
   - $g_{yy}(x,y) = 0$

   - $f(-1,1) = g(-1,1) = 2 + 1 - 5 - 1 + 5 = 2$
   - $f_x(-1,1) = g_x(-1,1) = 0$
   - $f_{xx}(-1,1) = g_{xx}(-1,1) = 4$
   - $f_{xy}(-1,1) = g_{xy}(-1,1) = f_{yx}(-1,2) = g_{yx}(-1,1)$ Por $g, f \in C^2 = -1$
   - $f_{yy}(-1,1) = g_{yy}(-1,1) = -1$

   $\boldsymbol{\nabla} f(-1,1) = (0,0)$ es punto critico

   $det(H_f) = -4 - (-1)(-1) = -5$ por el criterio del Hessiano pto silla

2. $\lim_{(x,y)\to(-1,1)} \frac{f(x,y)-2}{\|(x,y)-(-1,1)\|}$

   $f(x,y) = P_2(x,y) + R_2(x,y)$

   $\frac{f(x,y)-2}{\|(x,y)-(-1,1)\|} = \frac{P_2(x,y)+R_2(x,y)-2}{\|(x,y)-(-1,1)\|} =$

   $\frac{2x^2-xy+5x-y+3}{\|(x,y)-(-1,1)\|}$

   $2 + 1 - 5 - 1 + 3$