1. $f(x,y) = x^3y^5 + 2x^4y$
   - $f_x = 3x^2y^5 + 8x^3y$
   - $f_{xx} = 6xy^5 + 24x^2y$
   - $f_{xy} = 15x^2y^4 + 8x^3$
   - $f_y = x^3 5y^4 + 2x^4$
   - $f_{yy} = 20x^3y^3$
   - $f_{yx} = 15x^2y^4 + 8x^3$
2. $f(x,y) = \sin^2(x+y)$
   - $f_x = 2\sin(x+y)\cos(x+y)$
   - $f_{xx} = -2\sin^2(x+y) + 2\cos^2(x+y)$
   - $f_{xy} = -2\sin^2(x+y) + 2\cos^2(x+y)$
   - $f_y = 2\sin(x+y)\cos(x+y)$
   - $f_{yy} = -2\sin^2(x+y) + 2\cos^2(x+y)$
   - $f_{yx} = -2\sin^2(x+y) + 2\cos^2(x+y)$
3. $f(x,y) = \sqrt{x^2+y^2}$
   - $f_x = \frac{x}{\sqrt{x^2+y^2}}$
   - $f_{xx} = \frac{y^2}{(x^2+y^2)^{\frac{3}{2}}}$
   - $f_{xy} = \frac{xy}{(x^2+y^2)^{\frac{3}{2}}}$
   - $f_y = \frac{y}{\sqrt{x^2+y^2}}$
   - $f_{yy} = \frac{x^2}{(x^2+y^2)^{\frac{3}{2}}}$
   - $f_{yx} = \frac{xy}{(x^2+y^2)^{\frac{3}{2}}}$
4. $f(x,y) = \frac{xy}{x-y}$
   - $f_x = \frac{y^2}{(x-y)^2}$
   - $f_{xx} = \frac{-2y^2}{(x-y)^3}$
   - $f_{xy} = \frac{-2yx}{(x-y)^3}$
   - $f_y = \frac{x^2}{(x-y)^2}$
   - $f_{yy} = \frac{2x^2}{(x-y)^3}$
   - $f_{yx} = \frac{-2yx}{(x-y)^3}$