1. Find the limit of the function as
   \[
   \lim_{(x,y) \to (1,-1)} \frac{x^3 - y^3}{x^3 + y^3}
   \]

2. On the Domain $\mathbb{R}^2$, where the function is discontinuous $f(x,y) = \frac{2xy}{x^2 - y^2}$

3. Find Partial derivative of $F(w,x,y,z) = \cos(xz) \sin(2y+3w)$
   - $F_x, F_y, F_z, F_{xx}, F_{yy}, F_{ww}, F_{zz}$

4. Find Partial derivative of $F(w,x,y,z) = \tan(xyz)$
   - $F_x, F_y, F_z, F_{xx}, F_{yy}, F_{xy}, F_{zz}$

5. Chain Rule: Find the derivative $dF/dt$ where $F(x,y,z)$ and $x(t), y(t, p), z(t, p, q)$

6. Compute the gradient $\nabla f(x,y,z) = 3x + y - xye^{xz}$

7. Find all critical point(s) $f(x,y) = x^2 + 6x + y^2 + 8$

8. Find all critical point(s) $f(x,y) = x^4 - 6x + y^4$

9. Find all relative extrema or saddle point(s) $f(x,y) = x^4 - xy + 2y^2$

10. Find all relative extrema or saddle point(s) $f(x,y) = xye^{-x+y}$

11. Find all absolute extrema on domain $[0,1] \times [0,2]$ of $f(x,y) = x^2 - xy + 2y^2$

12. Use Lagrange multiplier to maximize or minimize the following
   - $f(x,y) = 2x + y + 10$ subject to $(x-1)^2 + 4(y-1)^2 = 1$
   - $f(x,y) = x^2y^2$ subject to $2x^2 + y^2 = 1$