For the function \( f(x, y) = x^3 + y^3 + 3x^2 - 3y^2 \)

1. Find all points at which both partials are 0.

2. Identify all local extrema. (I suggest you graph the function after the calculations are done)

3. Find the linear approximation of \( f \) at (1,1).

4. Find the quadratic approximation of \( f \) at (1,1).

5. At the points (1, 1) and (1, −1) find the slope in direction NE, NW, SE, and SW.

6. Optimize (both max and min) the function \( f(x, y) \) on the unit circle.
   (You should do the necessary "solving" by hand! You can then use technology to check...)

For experts:
7. Parametrize the unit circle (using \( \sin(t), \cos(t) \), for example) and use Calc 1 methods to identify the critical points found in 6 as local max or local min ("viewed along the constraint")