

Math 241H - Section 0301 - Fall 2017
Quiz 12-Review

Name: _____

You have all class to complete this. You may work in groups.

1. [2pts] Show that the surfaces $z = x^2 + 4y^2$ and $z = 4x + y^2 - 4$ have the same tangent plane at $(2, 0, 4)$.

2. [3pts] Find and classify all relative extrema of the function $f(x, y) = x^3 - 2xy + y^2$.

3. **[3pts]** Find all extreme values of the function $f(x, y) = x^2 + y^2 - 2x - 4y - 6$ on the region $x^2 + y^2 \leq 16$.

4. **[2pts]** Let $f(x, y, z) = xyz + z^3$ and let Σ be the surface given by the level set $f(x, y, z) = 12$. What is the direction \mathbf{u} of greatest increase for f at $(2, -1, 2)$? Find the tangent plane to Σ at $(2, -1, 2)$.