

HW 5
Math 261, F17

Please see the course syllabus for details on how to turn in your homework assignments. This one is due at the beginning of your class on **Friday, October 6**.

1. Find the derivative of $h(x, y, z) = x^2 + y^2 + 3z^2$ at the point $(2\sqrt{3}, 0, \sqrt{3})$ in the direction of the vector $\mathbf{v} = \langle 1, 1, 1 \rangle$.
2. Find the equation for the tangent plane to the surface $x^2 - xy - y^2 - z = 0$ at the point $(1, 1, -1)$. Please give your answer in the form $Ax + By + Cz = D$.
3. Give the best possible upper bound (using the technique from class) for the error in approximating $f(x, y) = x^2 + 3xy - 2y^2$ at the point $(1, 1)$, over the rectangle $|x - 1| \leq 0.1$, $|y - 1| \leq 0.3$. It is OK to leave your answer as a numerical expression (i.e., not simplified down to a number).
4. Suppose $f_{xx} = x + 2$, $f_{xy} = x + y - 2$, and $f_{yy} = y + 1$. Classify (min/max/SP) the critical points $(1, 1)$ and $(1, -1)$, clearly indicating any computed values you used to make your decision.

Be sure to study up on Lagrange multipliers, too, since we won't be able to give you homework on that before the exam!