

## MATH 341 – QUIZ # 1

**Instructions.** Show all your work. Be sure your name is on the booklet and that you have signed the honor pledge. You may *not* use calculators, notes, or any other form of assistance on this quiz.

- (1) Let  $f(x, y) = e^{2x+y}$ .
  - (a) Compute the Hessian of  $f$  at  $(0, 0)$ .
  - (b) Find the second order Taylor expansion of  $f$  about  $(0, 0)$  (be sure to indicate how big the error term is).
- (2) Find all the critical points of  $f(x, y) = y^4 - 2xy^2 + x^3 - x$ . Use the second derivative test to determine which are local max/min's or saddle points.
- (3) Find the maximum and the minimum of  $f(x, y, z) = x + y - z$  on the sphere  $x^2 + y^2 + z^2 = 81$ .