Economics 205, Fall 2001: Quiz 3

Instructions. Try to answer all three problems. (Read all of the questions now and start on the ones that seem easiest.) Make your answers as complete and rigorous as possible. In particular, give reasons for your computations and prove your assertions. Informal and intuitive arguments are better than nothing. Please think before you do computations (thinking may enable you to avoid needless computations).

1. Let $f(x, y) = x^2y + xy + y^3$.
   (a) Find $Df(x, y)$.
   (b) Find the directional derivative of f at the point $(x, y) = (1, 1)$ in the direction $v = (\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}})$.
   (c) Find the critical points of the function f.
   (d) Classify the critical points as local maxima, local minima, or neither.
2. Find the equation of the hyperplane tangent to the graph of f at the point $(x, y) = (2, -1)$.
3. Compute the derivative of the function $f(g(u, v))$ at the point $(u, v) = (0, 10)$ when $f(x, y) = x/y$ and $g(u, v) = (4u + v + 1, 10)$.