

## MATH 234: HOMEWORK 10

DUE: (TBA) VIA ILLINOIS COMPASS

1. Let  $F(x, y, z) = \frac{xz}{y^2z + x} - 5x^2y^3 + 2y$ . Compute  $\frac{\partial}{\partial y}F(x, y, z)$  and evaluate it at the point  $(-1, 0, 1)$ .
2. Let  $P(x, y, z) = xy + 2x^3\sqrt{y^2 - 1}$ . Compute  $\frac{\partial}{\partial z}P(x, y, z)$  and evaluate it at the point  $(2, 1, 3)$ .
3. Let  $f(x, y) = x^2 + 2xy + 5y^2 + 2x + 10y - 3$ . At which point does  $f(x, y)$  have a *possible* maximum or minimum?
4. Let  $f(x, y) = x^4 - y^2 - 2x^2 + 2y - 7$ . The first partial derivatives of  $f(x, y)$  are zero at the points  $(0, 1)$  and  $(-1, 1)$ . Use the second-derivative test to determine the nature of  $f(x, y)$  at each of these points.
5. What values of  $x$  and  $y$  maximize the function  $g(x, y) = x + 3y$  subject to the constraint  $x^2 + 9y^2 = 72$ ?