Math 220-04 Take-home quiz
Due 13 November 2015

For the function $f(x,y)=6y^2-2y^3+3x^2+6xy$, write out all first and second order partial derivatives

$f_x =$ $f_y =$

$f_{xx} =$ $f_{yy} =$

$f_{xy} =$

Find the critical values $(x_o, y_o)$ of the function, that is, those points where $f_x = 0$ and $f_y = 0$.

Solve the equation of the *discriminant* for *each* of the critical points you found:

$D = f_{xx} f_{yy} - f_{xy}^2$

Determine if these values constitute local maxima, minima, or saddle points using the criteria:

If $D < 0$ then $(x_o, y_o)$ is a saddle point.

If $D > 0$ then $(x_o, y_o)$ is $\begin{cases} \text{maximum if } f_{xx} < 0 \text{ or } f_{yy} < 0 \\ \text{minimum if } f_{xx} > 0 \text{ or } f_{yy} > 0 \end{cases}$

Finally, give the value of the function at the various extremes and/or saddle points.

Do the same for the function:

$$f(x, y) = 4x^2 + y^2 + 2x^2 y - 1$$