Write the best answer to each question in the box provided. Show your work.

1. Compute the partial derivatives $f_x$, $f_y$, $f_{xx}$, $f_{yy}$, and $f_{xy}$ if
   \[ f(x, y) = x^2 + 5xy + e^{2x+3y} \]
   \[
   f_x = \]
   \[
   f_y = \]
   \[
   f_{xx} = \]
   \[
   f_{yy} = \]
   \[
   f_{xy} = \]

2. Find all the critical points for the function $f(x, y) = x^3 - xy + y^2 + 43$.
   (Hint: $f_x(x, y) = x^2 - y$ and $f_y(x, y) = y - x$).
   

3. Suppose that we have the following table of values for the points (1, 1), (1, 2), and (1, 3).
   Classify the points as locations of a relative maximum, a relative minimum, or a saddle point. If it is impossible to tell if there is a saddle point or extremum at the point using the test in 9.3, then write “I cannot tell”.

\[
\begin{array}{c|cccc}
(a, b) & f_{xx}(a, b) & f_{yy}(a, b) & f_{xy}(a, b) \\
(1,1) & 1 & 2 & -2 \\
(1,2) & -3 & -5 & 1 \\
(1,3) & 2 & 8 & 4 \\
\end{array}
\]

(1, 1) :

(1, 2) :

(1, 3) :