

## Implicit Differentiation Homework

1.

Consider the curve given by  $x^2 + 4y^2 = 7 + 3xy$ .

- (a) Show that  $\frac{dy}{dx} = \frac{3y - 2x}{8y - 3x}$ .
- (b) Show that there is a point  $P$  with  $x$ -coordinate 3 at which the line tangent to the curve at  $P$  is horizontal. Find the  $y$ -coordinate of  $P$ .
- (c) Find the value of  $\frac{d^2y}{dx^2}$  at the point  $P$  found in part (b). Does the curve have a local maximum, a local minimum, or neither at the point  $P$ ? Justify your answer.

2.

Consider the curve defined by  $-8x^2 + 5xy + y^3 = -149$ .

- (a) Find  $\frac{dy}{dx}$ .
- (b) Write an equation for the line tangent to the curve at the point  $(4, -1)$ .
- (c) There is a number  $k$  so that the point  $(4.2, k)$  is on the curve. Using the tangent line found in part (b), approximate the value of  $k$ .
- (d) Write an equation that can be solved to find the actual value of  $k$  so that the point  $(4.2, k)$  is on the curve.
- (e) Solve the equation found in part (d) for the value of  $k$ .