Math 120F
October 16, 1997
Quiz #3 (20 points)

Name _____

TA section (Circle one): FA FB FC FD

Instructions: You have 30 minutes for this quiz. You **MUST** show work for credit. If in doubt, ask for clarification.

1. (6 points) This problem involves composition calculations. Start with the functions $f(x) = x^2, g(x) = 2x - 1, h(x) = 3$.

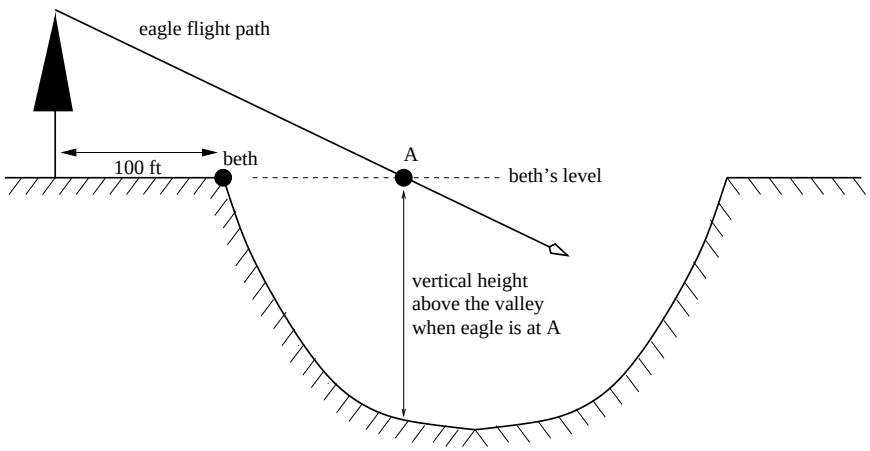
   (a) (4 pts.) Write the function $y = f(g(x))$ in vertex form; give the coordinates of the vertex.

   (b) (2 pts.) Calculate:

   i. h(f(x)) =

   ii. g(f(h(x))) =

2. (14 points) An eagle flies from the top of a 100 ft. high tree along a straight flight path as indicated. The eagle is 50 ft. vertically above Beth when it passes over her head. If we impose coordinates with Beth as the origin, the valley profile follows the graph of the function $y = \frac{1}{100}x^2 - 3x$.



   (a) (2 points) Where is the eagle located when it passes below Beth's level? (Find the coordinates of the point A.)

(b) (4 points) Assume the x-coordinate of the eagle at time t seconds is given by $x = -100+30t^2$. Find the location (coordinates) of the eagle a time $t = 3$ seconds. Also, determine the vertical height of the eagle above the valley at time $t = 3$ seconds. (This is the distance to a location in the valley which is vertically straight below the eagle at time $t = 3$.)

(c) (4 points) Assume the eagle continues on it's linear flight path until reaching the far side of the valley. Where does the eagle land in the valley? (Find the coordinates of the point.)

(d) (4 points) Find the location of the eagle where it has maximum vertical height above the valley.