Calculus I, Mathematics 1210-90

Examination 2, Mar 11,13, 2004

You may use graphing calculators. Each problem is worth 20 points. You MUST show your work. Just the correct answer is not sufficient for any points.

1. Consider the curve given by the equation: $y^2 + xy + x^2 = 1$. At what points does this curve have a horizontal tangent line?

2. A cat is walking toward a telephone pole of height 30 feet. She is walking at a steady rate of 4 ft/sec. A bird is perched on top of the telephone pole. When the cat is 42 feet from the base of the pole, at what rate is the distance between bird and cat decreasing?

3. Find all points of local maxima and minima of the function $f(x) = x(4 + x^{-2})$.

4. Find the dimensions of the right triangle with one vertex at the origin, the right angle on the positive x-axis, and the third vertex on the curve $y = 4 + x^{-2}$ which is of minimum area.

2. Let $y = 6x^2 + x^{-2}$.

a) Find the vertical asymptotes, and critical points of the graph.

b) Find the maximum and minimum points.

c) Graph the function.