Calculus I, Quiz 4, 2/16/7

Name:

Question 1
Let \( f(x) = x^3 - 3x^2 - 9x + 27 \), defined for \( x \) in the interval \([-2, 4]\).
Find the critical points and points of inflection of \( f \) and find its local and global maxima and minima.
Also roughly plot the graph of the function \( f \).

Question 2
A bird flies horizontally at a speed of 30 feet per second, maintaining an altitude of 200 feet above a bird-watcher.
How fast is the bird moving away from the bird-watcher, when its distance from the bird-watcher is 400 feet?

Question 3
A 50 foot ladder is resting against a wall, with its other end on horizontal ground. The end of the ladder in contact with the wall starts to slip down the wall at a rate of 3 feet per second. How fast is the lower end of the ladder moving away from the base of the wall when the lower end is 40 feet away from the base of the wall?

Question 4
Using an appropriate linear approximation (in particular stating your base-point), estimate the following quantities and say, giving your reasons, whether or not your estimate is an over-estimate or an under-estimate:

- \( \sqrt{26} \)

- \( e^{0.2} \)