1. (a) Find the linear approximation of \( f(x) = e^x \) at \( x = 0 \). Show all work.
   (b) Find the quadratic approximation of \( f(x) = e^x \) at \( x = 0 \). Show all work.

2. Find each of the following limits. (Some do and some do not need L'Hopital's Rule.) Show all work.
   (a) \( \lim_{x \to 0} \frac{e^{2x} - 1 - 2x}{x^2} \)
   (b) \( \lim_{x \to \infty} \frac{\ln x}{e^{1-x}} \)
   (c) \( \lim_{x \to \infty} (1 + \frac{2}{x})^{3x} \)

3. Find all local and absolute extrema of \( f(x) = x^3 - 9x \) on the interval \([-2, 1]\). Explain all work.

4. (a) Given any differentiable function \( f(x) \), write the equation of its tangent line at \( x = a \) in terms of \( f(a) \) and \( f'(a) \). Explain briefly how you obtain this equation.
   (b) Use part (a) above to obtain the recursion formula for Newton's Method: \( x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)} \).
      Explain your work, and draw a picture.

5. Let \( f(x) = x^5 + 2x - 1 \).
   (a) Does \( f \) have an inverse function? Why?
   (b) Find the derivative of \( f^{-1} \) at \(-1\). Explain all work.

6. A camera tracks the launch of a vertically ascending spacecraft. The camera is located at ground level 2 miles from the launch pad. When the spacecraft is 3 miles up, the camera angle (measured from the horizontal) is changing at a rate of \(1/2\) radians per second. Find the speed of the spacecraft and give its units. Show all work.