1. Let \( f(x) = \frac{x}{x-1} \).
   
   (a) \( (6 \text{ points}) \) Find the \( x \) and \( y \) intercepts of \( f(x) \).

   (b) \( (8 \text{ points}) \) Find the asymptotes of \( f(x) \) and use limits to justify your answers.
(c) (9 points) Over what intervals is \( f(x) \) increasing? Over what intervals is \( f(x) \) decreasing?

(d) (9 points) Over what intervals is \( f(x) \) concave up? Over what intervals is \( f(x) \) concave down?
(e) (4 points) Sketch a graph of $f(x)$. 

[Graph of $f(x)$ shown]
2. (13 points) Find the absolute extreme values of \( f(x) = x^3 - 3x^2 + 3x + 1 \) over \([0,2]\).

3. (15 points) Find the equation of the line tangent to the circle \( x^2 + y^2 = 25 \) at \((-3,4)\).
4. (10 points each) Differentiate the following:
   (a) $\ln(e^x + e^{-x})$
   
   (b) $\ln\left(\frac{1}{e^{x^2}}\right)$
Through some marketing research, Megadodo Publications knows that its best-selling book “The Hitchhiker’s Guide to the Galaxy” has the demand function $D(p) = 200 - 5p$ where $p$ is the price of the book and $D$ is the daily U.S. demand. What is the elasticity of demand, $E(p)$ for this book? The current price of the book is $10. In order to raise revenue, should Megadodo Publishing raise or lower the price (you must have work justifying your answer)?