Final Exam, Math 110

There are six questions on the exam. Each question is worth 10 points.

(3 points) 1. Find $f'(x)$ if
   a) $f(x) = x^3 + x + 1$, b) $f(x) = \frac{3}{x}$, c) $f(x) = \frac{1}{\sqrt{x}}$.

(3 points) 2. Find $f'(x)$ if
   a) $f(x) = x^2 e^x$, b) $f(x) = \frac{x}{x+1}$, c) $f(x) = e^x$.

(3 points) 3. Find $f'(x)$ using the definition if
   $$f(x) = x^2 + x.$$ 

(3 points) 4. Find the absolute maximum and minimum of $f(x) = 2x^3 - 3x^2 - 12x + 1$ for $-2 \leq x \leq 4$.

(3 Points) 5. Two kids are selling glasses of lemonade. Suppose the demand function is given by $q = 350 - 500p$. How many glasses can they sell if the price is $0.50 per glass? How many glasses should they make, and what should the price be if they want to maximize revenue?

(3 points) 6. A right triangle has a vertex at (0,0), one on the curve $y = e^{-\frac{x}{2}}$, $1 \leq x \leq 5$. One of the sides is part of the $x$-axis, the other is parallel to the $y$-axis. Find the maximum and minimum areas for such a triangle.