EXAM 2 - MATH 151 YOUR NAME:

Friday, February 27 George Voutsadakis

Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Calculate the following limits:

(a)
$$\lim_{x \to 0^+} \left(\frac{1}{\sqrt{x}} - \frac{1}{\sqrt{x^2 + x}} \right)$$

(b)
$$\lim_{x \to \pi/4} \frac{\sin x - \cos x}{\tan x - 1}$$

2. Suppose that for functions f and g, f(7) = 5, f'(7) = -3 and g(7) = 10, g'(7) = 2. Find h'(x) if you know that $h(x) = \frac{1}{f(x)g(x)}$.

3. Use the limit definition of the derivative to compute the derivative f'(a) of $f(x) = \frac{1}{x^2 + 3}$.

4. Find an equation for the tangent line to the graph of $f(x) = \frac{x^4 + e^x}{x+1}$ at x = 0.

5. Jimmy drops a ball (without initial velocity) from the top of a high building. His friend, who is a resident at a lower floor at a height of 60 meters from the ground, observes the ball passing in front of him and clocks that the ball hits the ground 2 seconds after passing in front of him. What is the height of the building? (Take $g \approx 10 \text{m/sec}^2$.)