HOMEWORK 2 - MATH 151

DUE DATE: Tuesday, January 30

INSTRUCTOR: George Voutsadakis

Read each problem **very carefully** before starting to solve it. Four out of the ten problems will be chosen at random and graded. Each problem graded is worth 3 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. Sketch an example of a function f that satisfies the following conditions: $\lim_{x\to -2} f(x) = +\infty$, $\lim_{x\to -\infty} f(x) = 4$ and $\lim_{x\to +\infty} f(x) = -2$.
2. Find the following limits: $\lim_{x\to 1} \frac{x-2}{(1-x)^2}$, $\lim_{x\to \frac{\pi}{2}+} \sec x$.
3. Find the limits $\lim_{x\to +\infty} (x - \sqrt{x})$, $\lim_{x\to +\infty} (x^2 - x^4)$, $\lim_{x\to +\infty} \frac{4x+7}{\sqrt{9x^2+2}}$.
4. Find a formula for a function that has vertical asymptotes $x = -2$ and $x = 5$ and horizontal asymptote $y = 2$.
5. Find the derivative $f'(a)$ of the function $f(x) = 3 - 7x - 2x^2$. Do the same for $f(x) = \frac{1}{\sqrt{x+3}}$.
6. Find the equation of the tangent line to the graph of $f(x) = \frac{x-1}{x-5}$ at $x = 6$.
7. The displacement of a particle moving in a straight line is given by the equation $s = \frac{1}{t^2}$, where t is measured in seconds. Find the velocity of the particle at time $t = a$.
8. Find the derivative of the function $f(x) = \frac{3-x}{1+3x}$. State the domain of f and the domain of f'.
9. Find the derivative $f'(x)$ of the function $f(x) = x^2 - \sqrt{x}$.
10. Find $f'(a)$ if $f(x) = \sqrt[3]{x}$ and $a \neq 0$.