HOMEWORK 3 - MATH 151

DUE DATE: Monday, October 8

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. Find the derivative $f'(a)$ of the function $f(x) = 3 - 7x - 2x^2$. Do the same for $f(x) = \frac{1}{\sqrt{x+3}}$.
2. Find the equation of the tangent line to the graph of $f(x) = \frac{x-1}{x-5}$ at $x = 6$.
3. 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 $t = a$.
4. Find the derivative of the function $f(x) = \frac{3-x}{1+3x}$. State the domain of f and the domain of f'.
5. Find the derivative $f'(x)$ of the function $f(x) = x^2 - \sqrt{x}$.
6. Find $f'(a)$ if $f(x) = \sqrt[3]{x}$ and $a \neq 0$.
7. Differentiate the following functions

$$(a)\ f(x) = x^3 - 4x + 6 \quad (b)\ f(x) = \frac{x^2 + 4x + 7}{\sqrt[3]{x}} \quad (c)\ f(x) = \sqrt[3]{x^2} + 2\sqrt{x^3}$$

8. Find the equations of the tangent line and the normal line to the curve $f(x) = -6\cos x$ at $(\frac{\pi}{3}, -3)$.
9. Find the first and the second derivatives of the following functions

$$(a)\ f(x) = 2\cos x - 3\sin x \quad (b)\ g(x) = \sqrt{x} + 5\sin x$$