EXAM 1 - MATH 112 Friday, February 6

YOUR NAME:_____ 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. Graph the piece-wise defined function $f(x) = \begin{cases} x+3, & \text{if } x < 1 \\ 1, & \text{if } 1 \leq x \leq 2 \\ -x+4, & \text{if } x > 2 \end{cases}$

2. Consider the piece-wise defined function $f(x) = \begin{cases} \dfrac{x^2-x-6}{x+2}, & \text{if } x < -2 \\ \sqrt{x+11}, & \text{if } x > -2 \end{cases}$.

   (a) Compute $\lim\limits_{x \to -2^-} f(x)$

   (b) Compute $\lim\limits_{x \to -2^+} f(x)$

   (c) Compute $\lim\limits_{x \to -2} f(x)$.

3. Use the limit definition of the derivative to find an equation for the tangent line to the graph of $f(x) = 2x^2 + 3$ at $x = 1$.

4. Use the limit definition of the derivative to find $f'(x)$ if $f(x) = \sqrt{3x + 2}$.

5. Use the basic rules for derivatives to calculate the derivatives:

(a) $(2015)' =$

(b) $(x^{2015})' =$

(c) $(3x^5)' =$

(d) $(\sqrt[5]{x})' =$

(e) $\left(\dfrac{5}{\sqrt[3]{x^2}}\right)' =$