PRACTICE EXAM 1 - MATH 112

DATE: Tuesday, September 25

INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. Each question is worth 5 points. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

- 1. Let $f(x) = \frac{1}{x}$ and $g(x) = \frac{x-5}{2x+6}$. Find a formula for $(g \circ f)(x)$ and simplify. (2 points) Find Dom(f) and Dom(g). (1 point) Find the domain of $g \circ f$. (2 points)
- 2. Find $f^{-1}(x)$ if $f(x) = \frac{6x-2}{2x+1}$. (5 points)
- 3. Find the following limits:
 - (a) $\lim_{x\to 2} \frac{x^2+x-6}{3x-x^2-2}$ (2.5 point)
 - (b) $\lim_{x \to -3} \frac{x^3 + 27}{x + 3}$ (2.5 points)
- 4. Consider the function $f(x) = \begin{cases} x^2 1, & \text{if } x < 2\\ 7, & \text{if } x = 2\\ -x + 5, & \text{if } x > 2 \end{cases}$
 - (a) Roughly sketch the graph of y = f(x). (2 points)
 - (b) Find the $\lim_{x\to 2} f(x)$, if it exists. (2 points)
 - (c) Is f continuous at x = 2? (1 point)
- 5. Use the **limit definition of the derivative** to compute the equation of the tangent line to the graph of $f(x) = \sqrt{x+2}$ at the point (7,3). (5 points)
- 6. (a) Find an equation for the tangent line to the graph of $f(x) = \sqrt[3]{x} + \sqrt[5]{x}$ at x = 1. (3 points)
 - (b) At which points does the graph of the function $f(x) = x^3 + x$ have a horizontal tangent line? (2 points)