

PRACTICE EXAM 1 - MATH 112

DATE: Friday, January 28

INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. Each question is worth 3 points. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. Consider the function $f(x) = \frac{2x-5}{x+7}$.
 - (a) Find the domain of f .
 - (b) Find a formula for the inverse $f^{-1}(x)$ of f .
2. Determine the following limits showing all steps in your work:

(a) $\lim_{x \rightarrow 4} \sqrt[3]{x+4}$

(b) $\lim_{x \rightarrow 9} \frac{\sqrt{x}-3}{x-9}$

(c) $\lim_{x \rightarrow -1} f(x)$, where $f(x) = \begin{cases} x^2, & \text{if } x < -1 \\ 11, & \text{if } x = -1 \\ -x^2 + 3, & \text{if } x > -1 \end{cases}$

3. Find the constant a so that the function

$$f(x) = \begin{cases} x^3, & \text{if } x \leq 2 \\ ax^2, & \text{if } x > 2 \end{cases}$$

be continuous on the entire real line.

4. Use the definition of the derivative to find the derivative of the function $f(x) = \frac{1}{x-1}$ at the point $x = -2$.
5. The height s in feet at time t in seconds of a silver dollar dropped from the top of the Washington monument is given by $s = -16t^2 + 555$. Find the following:
 - (a) the instantaneous velocity at time $t = 3$,
 - (b) how long it will take the dollar to hit the ground,
 - (c) the velocity of the dollar when it hits the ground.
6. Find the point(s) (if any) at which the graph of $f(x) = \frac{x^4+3}{x^2+1}$ has a horizontal tangent line.