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## SAMPLE EXAM I – MATH 135, SPRING 2008

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No graphing calculators allowed during exams.

- **Problem 1**

Find the domain and sketch the graph of the function  $f(x) = \frac{1}{x+3}$ , using the appropriate transformation.

- **Problem 2**

Find the limit

$$\lim_{x \rightarrow 3} \frac{x^2 - 9}{x^2 - 2x - 3}$$

- **Problem 3**

Prove the statement using the precise  $(\varepsilon - \delta)$  definition of the limit

$$\lim_{x \rightarrow 2} (5 - 2x) = 1$$

- **Problem 4**

Consider the function

$$f(x) = \begin{cases} \sqrt{-x}, & \text{if } x < 0 \\ 3 - x, & \text{if } 0 \leq x < 3 \\ (x - 3)^2, & \text{if } x \geq 3 \end{cases}$$

Determine the points where  $f$  is discontinuous, if any.

- **Problem 5**

Find the limit

$$\lim_{x \rightarrow \infty} (\sqrt{x^2 + 4x + 1} - x).$$

- **Problem 6**

Using the limit definition of the derivative, find  $f'(x)$  where

$$f(x) = \frac{1}{\sqrt{x+2}}$$

State the domain of the function and the domain of its derivative.

- **Problem 7**

Find the equation of the tangent line to the the curve  $y = x + \sqrt{x}$  at the point  $P(1, 2)$ .

- **Problem 8**

Differentiate the function

$$g(t) = \frac{t}{1 - t^2}$$

and determine the points where the tangent line is horizontal (if any!)