

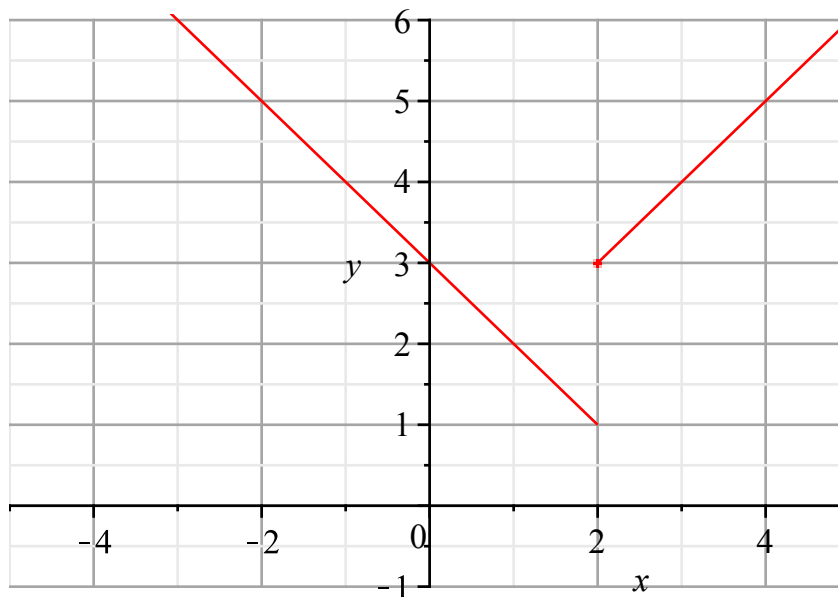
Math 1712 - Spring 2013
Quiz 2 - Show Your Work

Name: _____ TA: _____

1. (5 points) The function $f(x)$ and its graph are shown below:

$$\begin{cases} -x + 3 & x < 2 \\ x + 1 & 2 \leq x \end{cases}$$

(1)



Use this graph to find the following three limits. $\lim_{x \rightarrow 2^-} f(x) = 1$ $\lim_{x \rightarrow 2^+} f(x) = 3$ $\lim_{x \rightarrow 2} f(x) \text{ DNE}$

2. (10 points) Use **algebraic methods** to find the following limits. You must show your work and you may use the limit properties in the book. If the limit does not exist, write DNE.

a. $\lim_{x \rightarrow 3} \sqrt[3]{x - 11} = \sqrt[3]{3 - 11} = \sqrt[3]{-8} = -2$

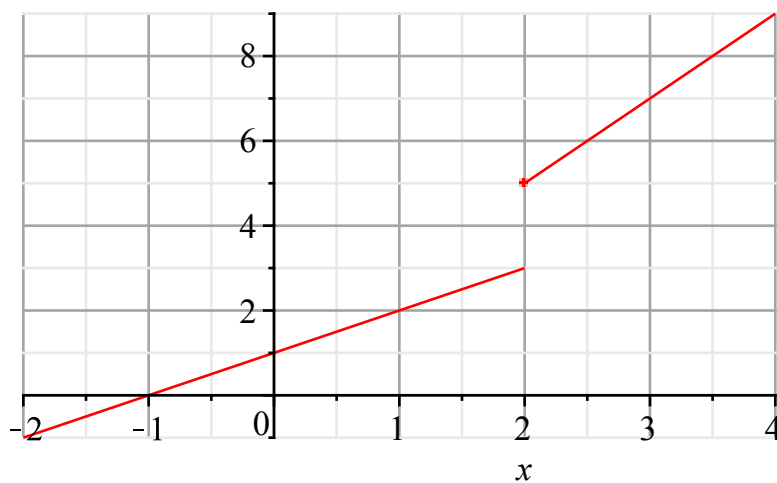
b. $\lim_{x \rightarrow -2} \frac{x^2 - 2x - 8}{x^2 - 4} = \lim_{x \rightarrow -2} \frac{(x + 2)(x - 4)}{(x + 2)(x - 2)} = \lim_{x \rightarrow -2} \frac{x - 4}{x - 2} = \frac{-6}{-4} = \frac{3}{2}$

c. $\lim_{x \rightarrow 3} \frac{x - 3}{x + 3} = \frac{0}{6} = 0$

3. (5 points) a. Sketch the graph of the function $g(x)$ given by:

$$\begin{cases} x + 1 & x < 2 \\ 2x + 1 & 2 \leq x \end{cases}$$

(2)



b. Is $g(x)$ continuous at $x = 2$? (yes or no). Use your graph to explain your answer.

$g(x)$ is not continuous at $x = 2$

Any of the following reasons are ok or any that you judge to be correct.

* **$g(x)$ has a jump discontinuity at $x = 2$.**

* **$\lim_{x \rightarrow 2^-} g(x) = 3$ and $\lim_{x \rightarrow 2^+} g(x) = 5$; these limits are not equal so $\lim_{x \rightarrow 2} g(x)$ DNE**

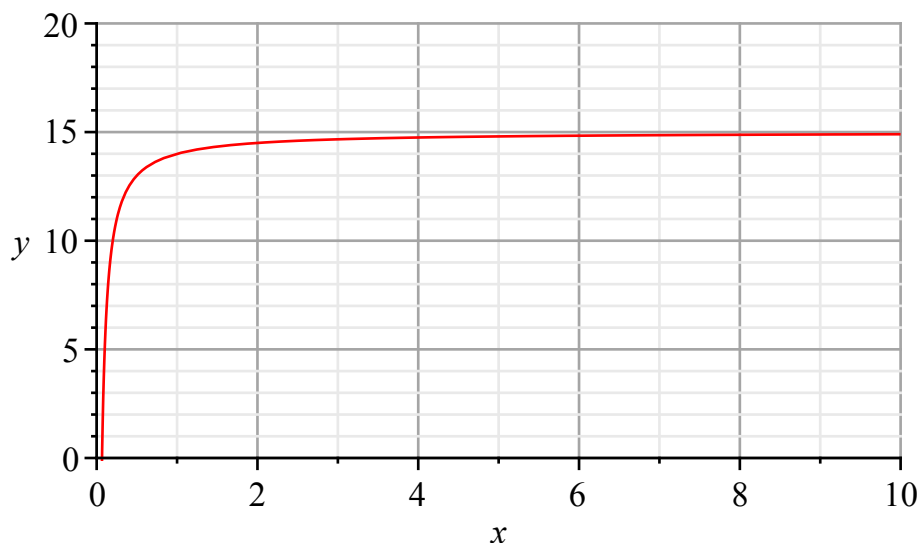
4. (10 points) The concentration y of a certain drug in a patient's blood is given by the function:

$y = f(x) = 15 - \frac{1}{x}$ where x is the time (in hours) after the drug was given to the patient. a. (5 points)

Use your calculator to sketch the graph of $y = f(x)$ with $x_{min} = 0$ **and** $x_{max} = 10$ and

$y_{min} = 0$ **and** $y_{max} = 20$ b. (3 points) From the graph, find $\lim_{x \rightarrow \infty} f(x)$. c. (2 points) Explain what this limit means in terms of the concentration

a. **Your graph should look like:**



b. $\lim_{x \rightarrow \infty} f(x) = 15$

c. **The maximum concentration of the drug is 15.**