

Name: _____

_____ / 25

There are 25 points possible on this quiz. No aids (book, calculator, etc.) are permitted. **Show all work for full credit.**

1. [11 points] Let $P(1, 4)$ be a point on the graph of $f(x) = \frac{8x}{x+1}$.

- a. Find the slope of the secant line passing through P and the point $Q(0, f(0))$.

$$f(0) = 0 \quad Q(0, 0) \quad m = \frac{4-0}{1-0} = 4$$

- b. Find the slope of the secant line passing through P and the point $Q(3, f(3))$.

$$f(3) = \frac{24}{4} = 6 \quad Q = (3, 6) \quad m = \frac{4-6}{1-3} = \frac{-2}{-2} = 1$$

- c. The table below lists the slope of the secant line passing through the point P and the point $Q(x, f(x))$ for several values of x .

x	0.9	0.99	0.999	1.001	1.01	1.1
$f(x)$	3.78947	3.97989	3.99799	4.00199	4.01990	4.19047
m_{sec}	2.10526	2.01005	2.00100	1.99900	1.99005	1.90476

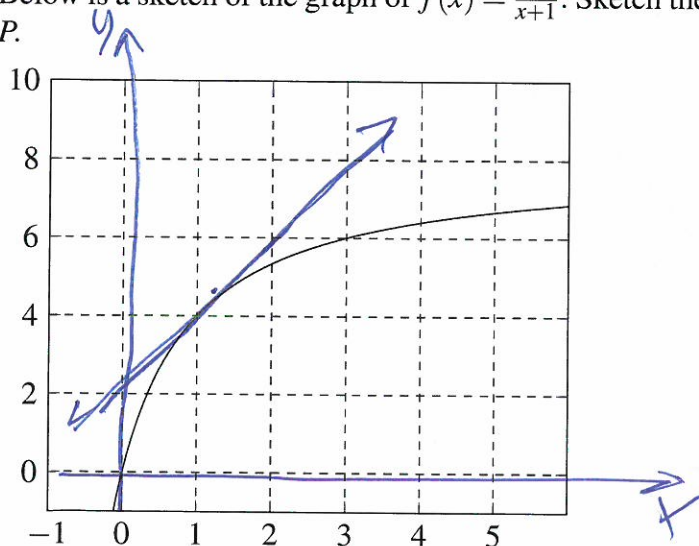
Use the information in the table to estimate the slope of the tangent line to $f(x)$ at the point $P(1, 4)$.

$$m_{tan} \approx 2$$

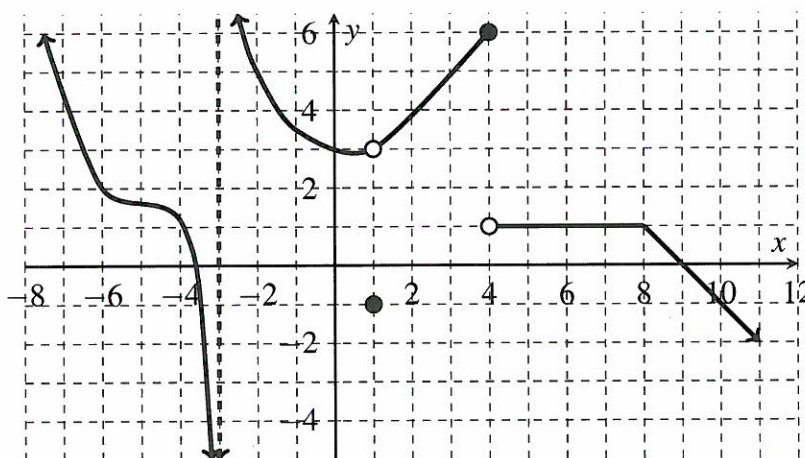
- d. Use the slope from part (c) above to write an equation of the tangent line at point P .

$$y - 4 = 2(x - 1) \quad \text{or} \quad y = 4 + 2(x - 1) \quad \text{or} \quad y = 2x + 2$$

- e. Below is a sketch of the graph of $f(x) = \frac{8x}{x+1}$. Sketch the tangent line to the graph at the point P .



2. [9 points] Use the graph of the function of $f(x)$ to answer the following questions. Give the most complete answer; if the limit is infinite, indicate that with ∞ or $-\infty$. If a value does not exist, write DNE.



- a. $f(1) = -1$ b. $f(4) = 6$ c. $f(6) = 1$
- d. $\lim_{x \rightarrow -3^-} f(x) = -\infty$ e. $\lim_{x \rightarrow -3^+} f(x) = \text{DNE}$ f. $\lim_{x \rightarrow 1} f(x) = 3$
- g. $\lim_{x \rightarrow 4^+} f(x) = 1$ h. $\lim_{x \rightarrow 4} f(x) = \text{DNE}$ i. $\lim_{x \rightarrow 6} f(x) = 1$

3. [5 points] On the axes below, sketch a graph satisfying **all** of the properties listed below.

$\lim_{x \rightarrow 2^-} f(x) = 5$, $\lim_{x \rightarrow 2^+} f(x) = 1$, $f(2) = 3$, $\lim_{x \rightarrow 4} f(x) = 3$, $f(4) = 0$

