

# TMATH 124 Quiz 1

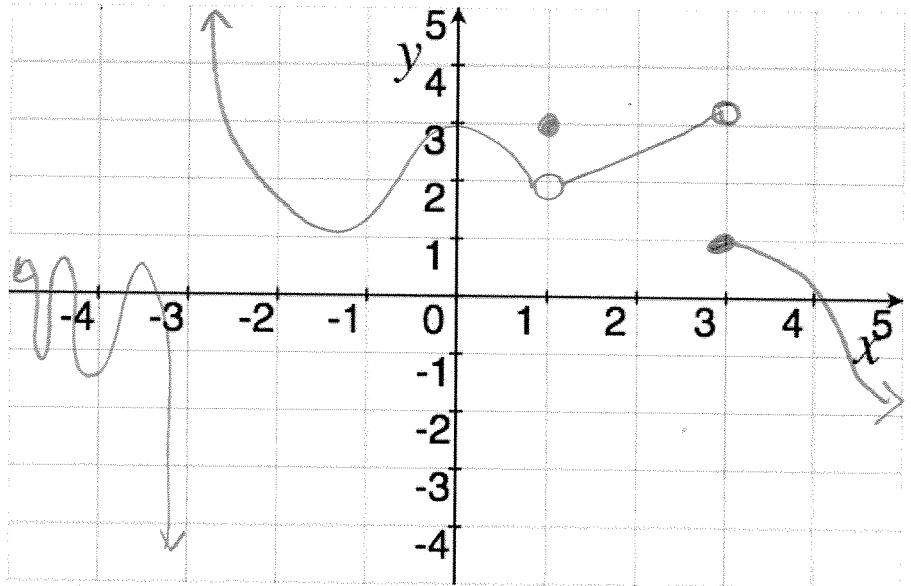
Key

Show *all* your work (numerically, algebraically, or geometrically) for each and simplify. No credit is given without supporting work.

1. [2] (§2.2 #15) Sketch the graph of an example function  $f$  that satisfies the following conditions:

(a)  $\lim_{x \rightarrow 1} f(x) = 2$

(b)  $f(1) = 3$



2. [3] (WebHW2 #10 & Winter '12 Quiz1 #2) Determine the following, if they exist:

$$\lim_{x \rightarrow 9^+} \frac{e^x}{(x-9)^3}$$

notation (+.5)  
analysis (+.5)  
got it (+.5)

note  $\lim_{x \rightarrow 9^+} e^x = e^9$

and  $\lim_{x \rightarrow 9^+} (x-9)^3 = \text{slightly positive}$

$$\lim_{x \rightarrow 9^+} \frac{e^x}{(x-9)^3}$$

$\frac{e^9}{\text{+small}} = \text{+big} \Rightarrow +\infty$

$x$	9.1	9.01	9.001
$\frac{e^x}{(x-9)^3}$	$\frac{e^{9.1}}{(9.1-9)^3}$	$\frac{e^{9.01}}{(9.01-9)^3}$	$\frac{e^{9.001}}{(9.001-9)^3}$
	8955292	8124521275	really Big

set up table (+.5)  
with reasonable values (+.5)  
got it (+.5)

$$\lim_{x \rightarrow 2} \frac{x \ln(x) - 2 \ln(x)}{x^2 - 4}$$

$$= \lim_{x \rightarrow 2} \frac{\ln x (x-2)}{(x+2)(x-2)}$$

$$= \lim_{x \rightarrow 2} \frac{\ln x}{x+2} = \frac{\ln 2}{2+2}$$

by L'Hopital's rule (+.5)

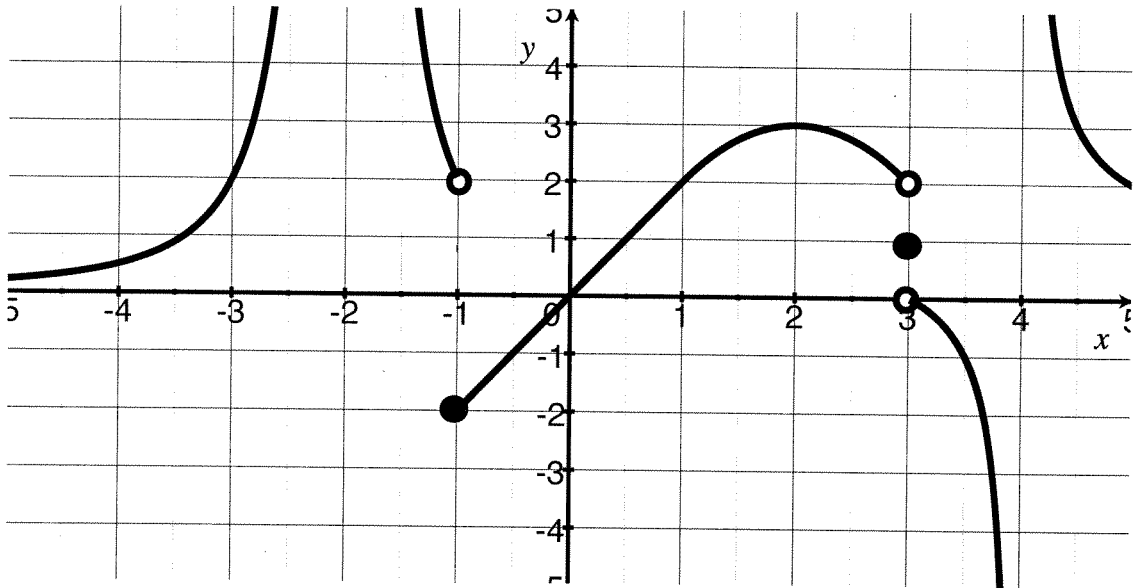
$$= \frac{\ln 2}{4} \approx 0.173$$

notation (+.5)  
alg (+.5)  
got it (+.5)

$x$	1.9	2.1
$\frac{x \ln x - 2 \ln x}{x^2 - 4}$	$\frac{1.9 \ln 1.9 - 2 \ln 1.9}{1.9^2 - 4}$	$\frac{2.1 \ln 2.1 - 2 \ln 2.1}{2.1^2 - 4}$

set up table (+.5)  
with reasonable values (+.5)  
got it (+.5)

3. [5] (§2.3 #2) For the function  $R$  whose graph is given, state the value of each quantity, if it exists.



$$\lim_{x \rightarrow 2} R(x)$$

3  
+1

$$\lim_{x \rightarrow -2} R(x)$$

∞  
+1

$$\lim_{x \rightarrow 3^-} R(x)$$

2  
+1

$$\lim_{x \rightarrow -1} R(x)$$

+1 DNE

b/c

$$\lim_{x \rightarrow -1^+} R(x) = -2 \neq 2 = \lim_{x \rightarrow -1^-} R(x)$$

$$\lim_{x \rightarrow -3} [x^2 R(x)]$$

$$= \lim_{x \rightarrow -3} (x^2) \cdot \lim_{x \rightarrow -3} R(x) \quad (+.5)$$

$$= (\lim_{x \rightarrow -3} x)^2 \cdot 2$$

$$= (-3)^2 \cdot 2$$

$$= 9 \cdot 2 = 18 \quad (+.5)$$