

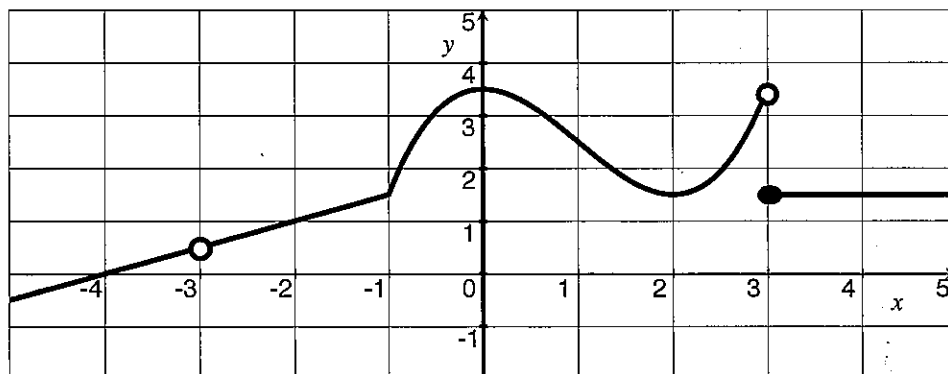
# Quiz 3

## TQS 211

Key

You are welcome to use any written homework from Chapter 2, worksheets you completed, and a calculator but no books or class notes. Show *all* your work (algebraically or geometrically) for each and simplify. No credit is given without supporting work.

- Let  $g$  be the piece-wise defined function below. This means the graph of  $g$  is the *entire* graph shown below.



- [2] Find the following if possible:

$$\lim_{x \rightarrow -3} g(x)$$

$\frac{1}{2}$  (+1)

$$g(-3)$$

does not exist

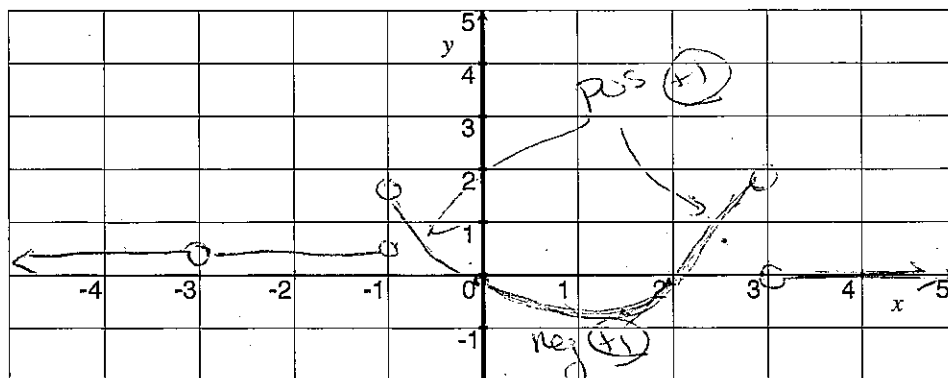
(+1)

- [3] At what  $x$  values is  $g$  not continuous?

-3 and 3 (+1)

no more (+.5)  
idea point (+1)  
sketch (+.5)

- [5] Sketch the graph of  $g'$ .



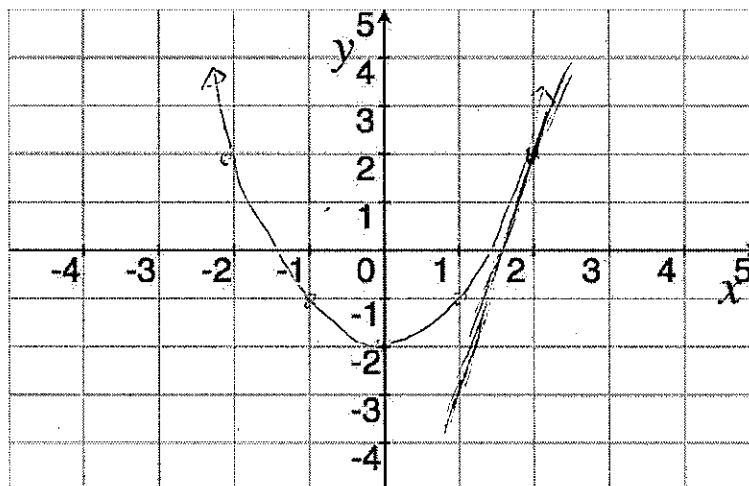
stat (+1)

zeros (+1)

stat (+.5) at 0 (+.5)

2. Consider  $f(x) = x^2 - 2$ .

(a) [1] Carefully graph  $f$ .



(b) [1] Find the total change of  $f$  from when  $x = -1$  to  $x = 2$ .

$$\text{total change} = f(2) - f(-1) = [2^2 - 2] - [(-1)^2 - 2] = 2 - [-1] \\ = 2 + 1 = 3$$

(c) [1] Find the average rate of change of  $f$  from  $x = -1$  to  $x = 2$ .

$$\text{ave rate of change} = \frac{f(2) - f(-1)}{2 - (-1)} = \frac{3}{3} = 1$$

(d) [3] Estimate the rate of change of  $f$  when  $x = 2$ .

$$\text{down } 5 \text{ over } 1 \text{ so } \frac{5}{1}$$

~~down 5~~

draw the line  $\oplus 5$   
 draw the line  $\oplus 1$   
 find the slope  $\oplus 1.5$  } use df  $\oplus 1$   
 with small h value  $\oplus 1$   
 alg  $\oplus 1$

(e) [4] Find  $f'(2)$  algebraically.  $\oplus 1$

$$f'(2) = \lim_{h \rightarrow 0} \frac{f(2+h) - f(2)}{h} = \lim_{h \rightarrow 0} \frac{[(2+h)^2 - 2] - [2^2 - 2]}{h} \\ = \lim_{h \rightarrow 0} \frac{4h + h^2}{h} = \lim_{h \rightarrow 0} \frac{4h + h^2}{h} \\ = \lim_{h \rightarrow 0} \frac{h(4+h)}{h} = \lim_{h \rightarrow 0} (4+h) = \lim_{h \rightarrow 0} 4 + \lim_{h \rightarrow 0} h \\ = 4 + 0 = 4^2$$

alg  $\oplus 1.5$   
 $\oplus 1.5$  not limit