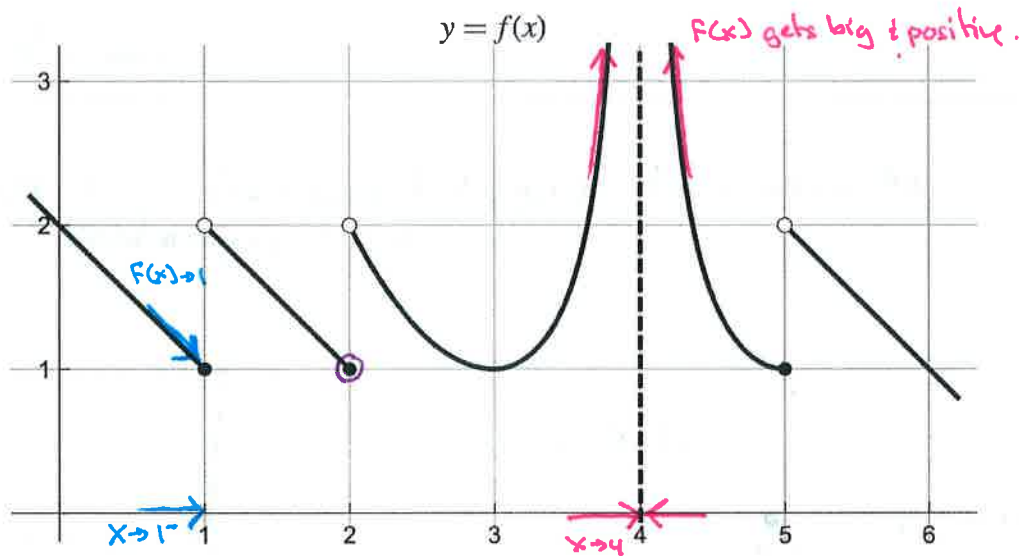


This is an open-book, open-notes quiz, and you may take as much time as you like. However, work alone; tutors, other students, internet, and so on are off limits. Write your answers on this quiz sheet and have it ready to turn in at the beginning of class on Tuesday, October 11.



(12 pt) 1. Graph reading: Read each of the following values from the graph of  $f(x)$  above.

Answer with  $+\infty$  or  $-\infty$  if applicable.

Otherwise, if the limit or function value is undefined, just say so.

a.  $f(2) = 1$

b.  $f(4)$  is undefined - there's no point on the graph at  $x=4$ .

c.  $\lim_{x \rightarrow 1^-} f(x) = 1$

d.  $\lim_{x \rightarrow 1} f(x)$  doesn't exist (there is no  $\underline{z}$ -sided limit as  $x \rightarrow 1$ ).

e.  $\lim_{x \rightarrow 4} f(x) = +\infty$

f.  $\lim_{x \rightarrow 2} f(x)$  doesn't exist  $\lim_{x \rightarrow 2^-} f(x) = 1$  but  $\lim_{x \rightarrow 2^+} f(x) = 2$   
so the  $\underline{z}$ -sided limit does not exist.

(4 pt) 2. True/False I. Refer to the graph of the function  $f(x)$  above to answer these.

F a.  $f$  is continuous on the closed interval  $[3, 4]$ .  $f$  isn't continuous at  $x=4$  - not even defined!

T b.  $f$  is continuous on the open interval  $(2, 3)$ . true, but it isn't continuous on  $[2, 3]$ .

T c.  $f$  has a nonremovable discontinuity at  $x = 1$   $\lim_{x \rightarrow 1} f(x)$  doesn't exist.

(Go on to #3 on the back)

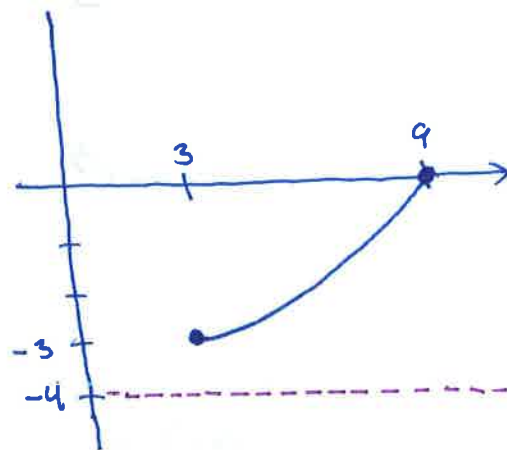
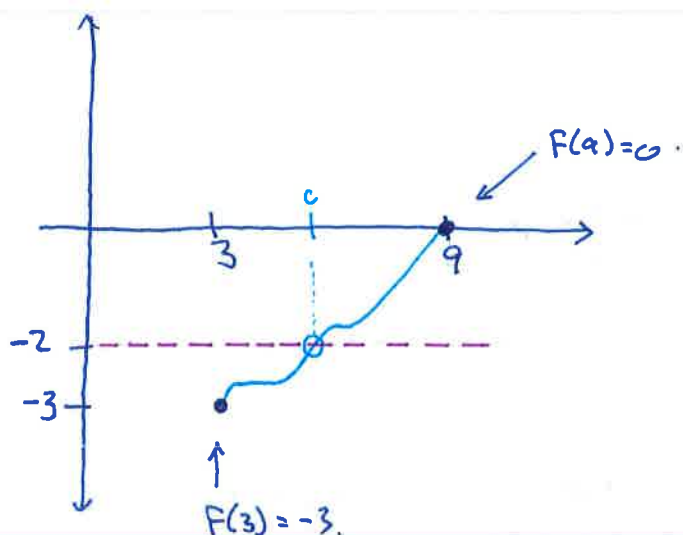
(4 pt) 3. True/False II.

Assume that  $f$  is a *polynomial* function, with  $f(3) = -3$  and  $f(9) = 0$ .

T a.  $f$  must be continuous on  $(-\infty, +\infty)$ . <sup>all</sup> polynomials are continuous on  $(-\infty, \infty)$ .

T b. There must be at least one value  $c$  in  $[3, 9]$  where  $f(c) = -2$ . intermediate value thm.

F c. There must be at least one value  $c$  in  $[3, 9]$  where  $f(c) = -4$ .  
not necessarily!  $-4$  isn't between  $f(3)$  and  $f(9)$ ,  
so this isn't guaranteed.



b. Any continuous function on  $[3, 9]$  will have to pass through the intermediate value  $-2$  at at least one point.

c. there's no reason that  $f(x)$  would have to take the value  $-4$  at any point in  $[3, 9]$ .