

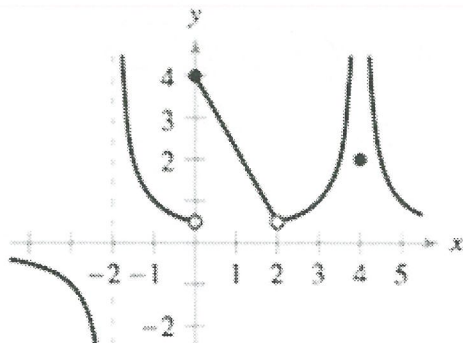
Name: Key

Math 151 Calculus I - Crawford

Quiz 1-A

11 September 2019

Books, notes (in any form), and calculators are not allowed. Show all your work. Good Luck!



1. (3 pts) Given the graph of  $f(x)$  above, state the value of each quantity below, if it exists. Clearly indicate  $+\infty$  or  $-\infty$  in the case of an infinite limit. If the quantity does not exist, state DNE.

Version A

(a).  $\lim_{x \rightarrow -2^-} f(x) = \boxed{-\infty}$

(b).  $\lim_{x \rightarrow 2} f(x) = \boxed{0.5}$

(c).  $f(4) = \boxed{2}$

Version B

$\lim_{x \rightarrow 0^-} f(x) = \boxed{0.5}$

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

$f(2) = \boxed{\text{DNE}}$

2. (2 pts) For the same function  $f(x)$  given above, explain why the function is discontinuous at  $x = 4$ . i.e., Explain which of the three conditions from the definition of continuity do not hold. [Stating what type of discontinuity is not sufficient.] At  $x = 4$

①  $f(4) = 2$  (exists).

But ②  $\lim_{x \rightarrow 4} f(x)$  DNE (infinite limit)

③ Also fails since ② DNE

Condition

② doesn't hold  
∴ not continuous

At  $x = 0$  ← Version B

①  $f(0) = 4$  ✓

But ②  $\lim_{x \rightarrow 0} f(x)$  DNE (one-sided limits are not equal)

③ Also fails since ② DNE

3. (10 pts) Evaluate the following limits, if they exist. Clearly indicate  $+\infty$  or  $-\infty$  in the case of an infinite limit. If the limit does not exist, clearly explain the reason why.

(a)  $\lim_{x \rightarrow 4} \frac{x^2 - 4x}{x^2 - 2x - 8} = \lim_{x \rightarrow 4} \frac{x(x-4)}{(x-4)(x+2)} = \lim_{x \rightarrow 4} \frac{x}{x+2}$

$\frac{16-16}{16-8-8} \rightarrow \frac{0}{0}$   
 IND. FORM

$= \frac{4}{4+2} = \frac{4}{6} = \frac{2}{3}$

(b)  $\lim_{x \rightarrow 1} \frac{1-2x}{x-1}$

DNE Since the one-sided limits are different

$\frac{1-2}{1-1} \rightarrow \frac{-1}{0}$

Work required to justify answer

Infinite limit

⇒ Check one-sided limits:

$\lim_{x \rightarrow 1^-} \frac{1-2x}{x-1} = +\infty$

eg 0.9  $\frac{(-)}{(-)} \rightarrow +$

$\lim_{x \rightarrow 1^+} \frac{1-2x}{x-1} = -\infty$

eg 1.1  $\frac{(-)}{(+)} \rightarrow -$