

# Quiz 1A, Calculus I - Calculators okay

Dr. Graham-Squire, Spring 2014

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4 ⇒ 15 min.

Name: Key

1. (6 points) Evaluate the limits. Show your work for full credit!

$$(a) \lim_{x \rightarrow 7} \left( \frac{2}{x-7} - \frac{14}{x(x-7)} \right) = \lim_{x \rightarrow 7} \frac{2x - 14}{x(x-7)} = \lim_{x \rightarrow 7} \frac{2(x-7)}{x(x-7)} = \boxed{\frac{2}{7}}$$

$$\frac{2}{0} - \frac{14}{0}$$

Do more work!

$$(b) \lim_{x \rightarrow 4^-} \frac{x^2 - 16}{x^2 - 8x + 16} = \lim_{x \rightarrow 4^-} \frac{(x-4)(x+4)}{(x-4)(x+4)} = \frac{8}{0} \Rightarrow \infty \text{ or } -\infty$$

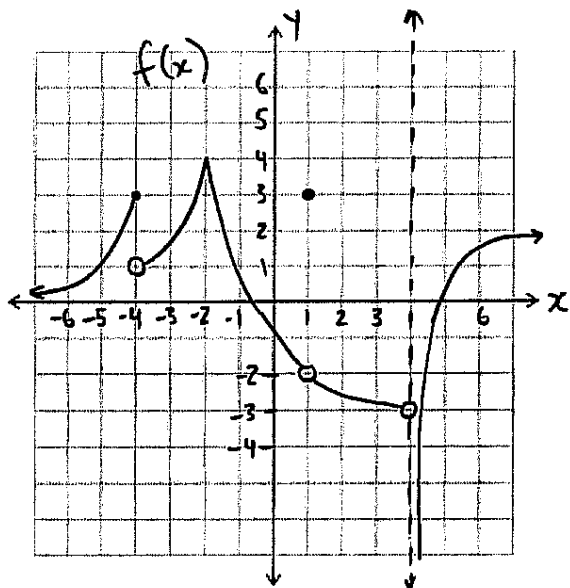
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$$\text{as } x \rightarrow 4^-, \quad x-4 < 0 \Rightarrow \frac{+}{-} \Rightarrow \boxed{-\infty}$$

$$\text{or } \lim_{x \rightarrow 4^-} \frac{x^2 - 16}{x^2 - 8x + 16} = \frac{0}{-32} = \boxed{0}$$

$$(c) \lim_{x \rightarrow 4^+} \frac{\sqrt{x} - 2}{x - 2} = \frac{\sqrt{4} - 2}{4 - 2} = \frac{2 - 2}{2} = \frac{0}{2} = \boxed{0}$$

2. (4 points) (a) Use the graph of  $f(x)$  to calculate the expressions below. If the limits does not exist, write  $\infty$ ,  $-\infty$ , or DNE, whichever is most appropriate.



(i)  $\lim_{x \rightarrow 4^+} f(x) = -\infty$

(ii)  $\lim_{x \rightarrow \infty} f(x) = 2$

(iii)  $\lim_{x \rightarrow (-2)} f(x) = 4$

(iv)  $\lim_{x \rightarrow (-4)^+} f(x) = 1$

(v)  $f(1) = 3$

- (b) Find one place where  $f(x)$  is discontinuous and explain why the function is discontinuous. You must use the definition of continuity in your explanation in order to receive full credit.

$f(x)$  is discontinuous at  $x = -4$  because  $\lim_{x \rightarrow (-4)^-} f(x) = 3$  and

$\lim_{x \rightarrow (-4)^+} f(x) = 1$ , so  $\lim_{x \rightarrow (-4)} f(x)$  does not exist.

Also at  $x = 1$  b/c  $\lim_{x \rightarrow 1} f(x) = -2$  but  $f(1) = 3$

Also at  $x = 4$  b/c  $\lim_{x \rightarrow 4^+} f(x)$  does not exist  $\Rightarrow \lim_{x \rightarrow 4} f(x)$  does not exist.