

# Calculus Honors

## Homework-3      Q2

### Studyguide

#### Exercise 2.

Determine whether the following statements are true or false

1.  $\lim_{x \rightarrow 0^+} \frac{1}{x} = +\infty.$
2.  $\lim_{x \rightarrow 1^-} \frac{1}{x-1} = -\infty.$
3.  $\lim_{x \rightarrow 4^-} \frac{3}{x-4} = +\infty.$
4.  $\lim_{x \rightarrow 2^+} \frac{-1}{x-2} = +\infty.$
5.  $\lim_{x \rightarrow 3^-} \frac{-2}{x-3} = -\infty.$
6.  $\lim_{x \rightarrow 1^+} \frac{5}{(x-1)^2} = +\infty.$
7.  $\lim_{x \rightarrow 5^-} \frac{7}{(x-5)^2} = -\infty.$
8.  $\lim_{x \rightarrow 3^+} \frac{-5}{(x-3)^2} = -\infty.$
9.  $\lim_{x \rightarrow 2^+} \frac{x-1}{x^2-3x+2} = +\infty.$
10.  $\lim_{x \rightarrow 1^+} \frac{x+1}{x^2-1} = -\infty.$

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**Exercise 2.**

In the following exercises, apply the "Intermediate Theorem" to the indicated interval and find a value  $c$  which belongs to the interval so that  $f(c) = 0$ .

1.  $f(x) = x^2 + x - 1$ ,  $[0, 5]$ .
2.  $f(x) = x^2 - 6x + 8$ ,  $[0, 3]$ .
3.  $f(x) = x^3 - x^2 + x - 2$ ,  $[0, 3]$ .

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**Exercise 3.**

Determine all the vertical asymptotes of the graph of the following functions:

$$1. \ f(x) = \frac{1}{2(x+1)}.$$

$$2. \ f(x) = \frac{x^2+1}{x^2-1}.$$

$$3. \ f(x) = \frac{x^2-1}{x-2}.$$

$$4. \ f(x) = \frac{x-1}{x^2-3x+2}.$$

$$5. \ f(x) = \frac{x^2+2x-8}{x^2-4}.$$