



Name: _____

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(version M)

Cal I (S) (Maths 201–NYA)

NYA Cal I — Quiz 3

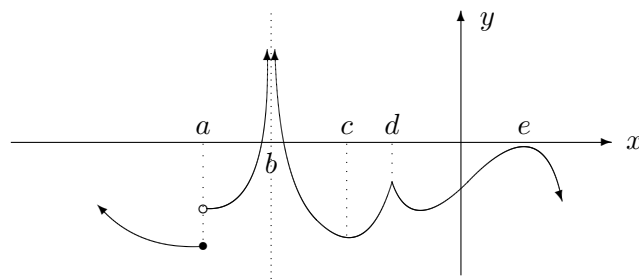
1. Suppose $f(x) = \begin{cases} \frac{x^2 - 4}{x^2 - x - 6} & \text{if } x \leq -1 \\ \frac{1}{4}x + 1 & \text{if } -1 < x < 5 \\ \frac{1}{x^2 - 10x - 24} & \text{if } x \geq 5 \end{cases}$

Find the values of x for which f is discontinuous. For each of these, specify whether the discontinuity is removable, jump, or infinite.

2. Find all values of k that make the function g continuous at $x = 3$:

$$g(x) = \begin{cases} \frac{1}{k+1-x} & \text{if } x \leq 3 \\ \sqrt{\frac{x^2 - 5x + 6}{k(x-3)}} & \text{if } x > 3 \end{cases}$$

3. At the right is given the graph of a function; for each of the points $x = a, b, c, d, e$ state whether the function is (i) continuous and/or (ii) differentiable at the point. (Remember that “is differentiable” means “has a derivative”.)



4. Let $f(x)$ be a continuous and differentiable function on the interval $[0, 3]$. If $f'(x) \leq 2$ for all values of x and $f(0) = 4$, then what is the maximum possible value of $f(3)$?

5. For each of the following conditions, draw a rough sketch of the graph of a function which satisfies that condition. If the stated condition is impossible, say so, and explain why.
- (a) The function must be continuous everywhere but not differentiable at $x = 0$.
 - (b) The function must be differentiable everywhere, but not continuous at $x = 0$.
 - (c) The function must not be continuous at $x = 0$, but $\lim_{x \rightarrow 0} f(x)$ must be defined.