Name: _____

Instructor: Dr. R.A.G. Seely
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Quiz 3
(version for marks!)

Cal I (S) (Maths 201–NYA)

NYA Cal I — Quiz 3

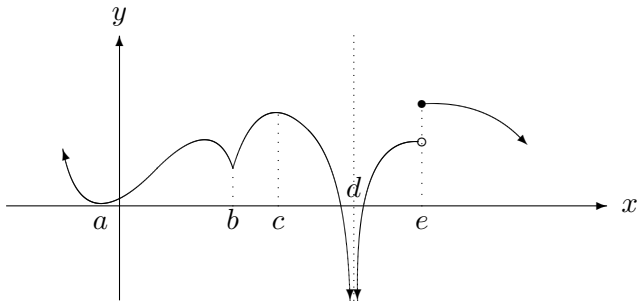
1. Suppose $f(x) = \begin{cases} \sin(\frac{\pi}{2}x) & \text{if } x < 3 \\ 5 - 2x & \text{if } 3 \leq x \leq 5 \\ x^2 & \text{if } x > 5 \end{cases}$

   Find the values of x for which f is discontinuous. At which of these is f continuous from the right, from the left, or neither?

2. For what value(s) of the constants a, b is the function g continuous everywhere?

$$g(x) = \begin{cases} ax^2 + b & \text{if } x < 1 \\ x - a & \text{if } x \geq 1 \end{cases}$$

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. The function $f(x)$ may or may not have one or more removable discontinuities. Define another function, which equals f for all other points, but removes the removable discontinuities.

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

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 $\lim_{x \to 0} f(x)$ must be defined.