Limits and Continuity

Thursday, 22 March 2018 11:31 AM

By the end of the teaching I am asking that you complete the following work:

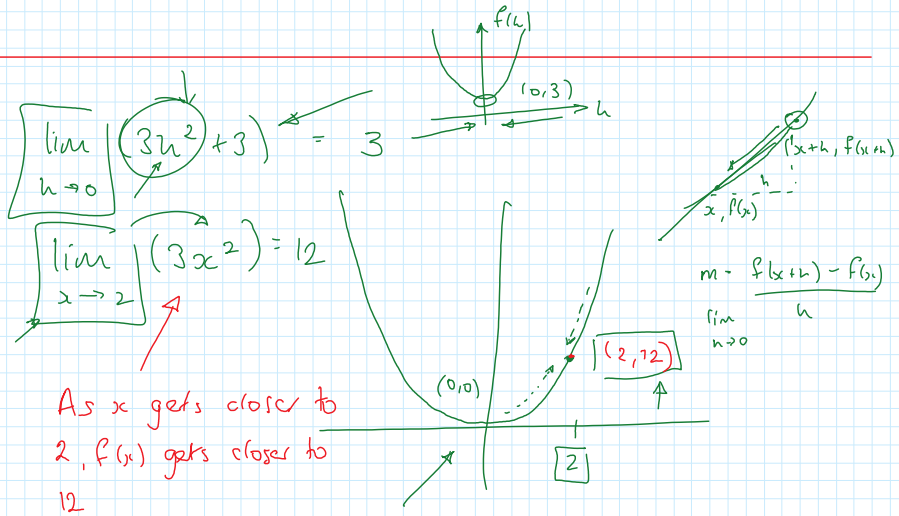
Limits & Continuity	9L	1-4(s)

Limit Notation

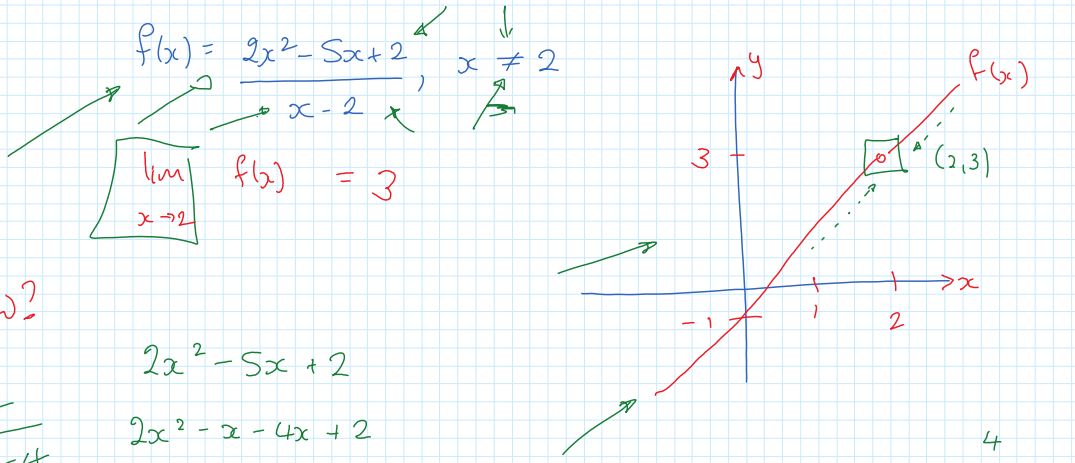
We have (briefly) touched on limits before when we looked at the ideas of differentiation from first principles. Limits are really important to us in Methods and so we will be looking at the more in this lesson.

When we "take the limit" we are effectively looking at what happens to a function as we get closer and closer to a particular value of x.

This can be considered from both sides of the function.



Problems!



How?

$2x^2 - 5x + 2$

$2x^2 - x - 4x + 2$

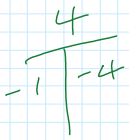
$x(2x-1) - 2(2x-1)$

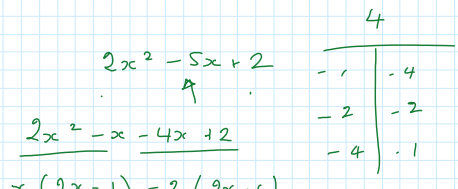
$(2x-1)(x-2)$

$f(x) = \dfrac{(2x-1)(x-2)}{(x-2)}$

$\lim_{x\to 2} f(x) = \lim_{x\to 2} (2x-1)$

$= 3$





$\lim_{x\to 2} f(x) = \lim_{x\to 2} (2x-1) = 3$

Limit Algebra

If $\lim_{x\to a}[f(x) + g(x)] = \lim_{x\to a} f(x) + \lim_{x\to a} g(x)$

eg. $\lim_{h\to 0}(3h+4) = \lim_{h\to 0} 3h + \lim_{h\to 0}(4)$

$\lim_{x\to a}[k\,f(x)] = (k)\lim_{x\to a} f(x)$

$\lim_{x \to a} [k f(x)] = k \lim_{x \to a} f(x)$

$\lim_{x \to a} (f(x)g(x)) = \lim_{x \to a} f(x) \times \lim_{x \to a} g(x)$

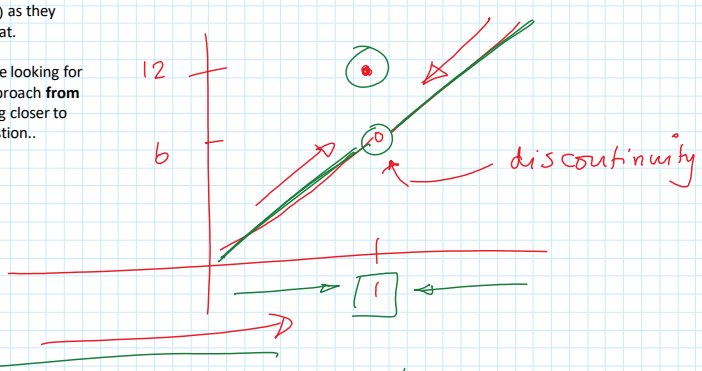
eg $\lim_{x \to 2} 4x(x+2) = \lim_{x \to 0} (4x) \times \lim_{x \to 2} (x+2)$

$\lim_{x \to a} \frac{f(x)}{g(x)} = \frac{\lim_{x \to a} f(x)}{\lim_{x \to a} g(x)}$

Continuity

For a function to be continuous at a point we need to consider the values of $f(x)$ as they approach the point we are looking at.

For a graph to be continuous we are looking for the values of the points as they approach **from both the left and right** to be getting closer to the same value as the point in question..



$f(1) = 12$

$\lim_{x \to 1^-} f(x) = 6$

$\lim_{x \to 1^+} f(x) = 6$

$\lim_{x \to 1^-}$

$x \to 1^+$

$f(1) = 12$

$\lim_{x \to 1^-} f(x) = 6$

$\lim_{x \to 1^+} f(x) = 6$

$\therefore$ Discontinuity @ $x = 1$