A Level Maths - FP2 Sam Robbins 13SE

# Inequalities

## 1 Solving inequalities

We can build upon our previous algebraic skills in order to solve more complex inequalities Remember:

- Don't multiply anything that could be negative use "squared" things
- Find the critical values (f(x)=0)
- Sketch the graph to solve

## 1.1 Examples

#### 1.1.1 Example 1

$$2x^2 < x + 3$$

Move all terms to one side

$$2x^2 - x - 3 < 0$$

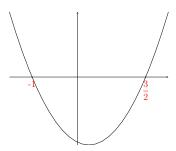
Factorise

$$(2x-3)(x+1) < 0$$

Solve to find critical values

CVs: 
$$x = \frac{3}{2}, -1$$

Draw graph to find inequality



Write inequality for when the graph is below the x axis

$$-1 < x < \frac{3}{2}$$

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### 1.1.2 Example 2

$$\frac{x}{x+1}<\frac{2}{x+2}$$

Multiply both sides by  $(x+1)^2(x+3)^2$ 

$$x(x+1)(x+3)^2 < 2(x+3)(x+1)^2$$

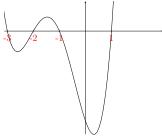
Put all terms on one side

$$x(x+1)(x+3)^2 - 2(x+3)(x+1)^2 < 0$$

Simplify

$$(x+1)(x+3)(x(x+3) - 2(x+1)) < 0$$
$$(x+1)(x+3)(x+2)(x-1) < 0$$

Plot graph



Write the inequality for when the graph is below the x axis

$$-3 < x < -2, -1 < x < 1$$