

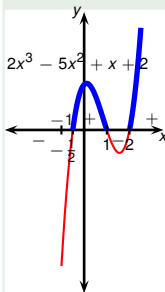
Precalculus

Cubic inequality

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2019

Example



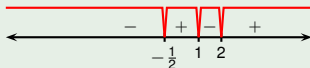
Plot the function $2x^3 - 5x^2 + x + 2$. Solve the inequality.

$$2x^3 - 5x^2 + x + 2 > 0$$

$$2(x - (-\frac{1}{2}))(x - 1)(x - 2) > 0$$

$$x \in (-\frac{1}{2}, 1) \cup (2, \infty)$$

Left hand side vanishes when $x = -\frac{1}{2}$, when $x = 1$ and when $x = 2$. The two roots split the real line into four intervals: $(-\infty, -\frac{1}{2})$, $(-\frac{1}{2}, 1)$, $(1, 2)$, $(2, \infty)$.



Interval	Factor signs	Final sign from plot
$(-\infty, -\frac{1}{2})$	$(-)(-)(-)$	$-$
$(-\frac{1}{2}, 1)$	$(+)(-)(-)$	$+$
$(1, 2)$	$(+)(+)(-)$	$-$
$(2, \infty)$	$(+)(+)(+)$	$+$