Precalculus
Polynomial inequalities

Todor Milev

2019

Outline

Example

Solve the inequality.

$$2x^2 + 3x - 5 \geq 0$$

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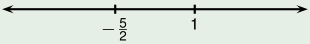

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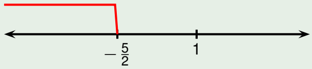

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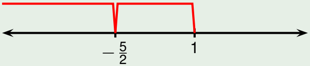

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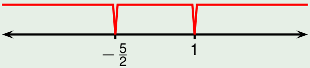

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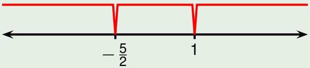

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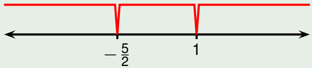

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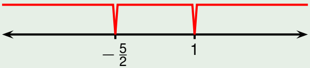

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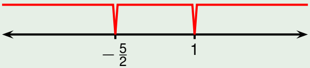

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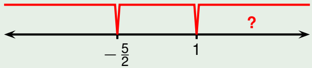

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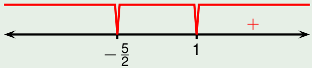

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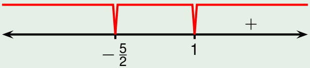

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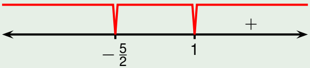

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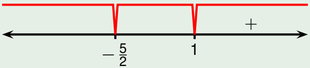

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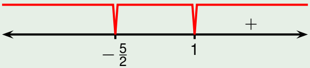

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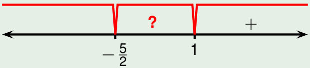

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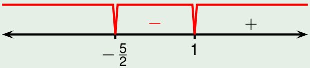

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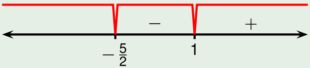

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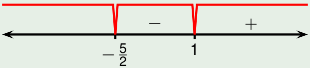

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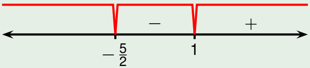

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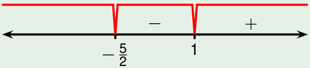

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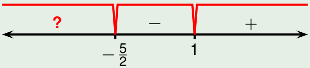

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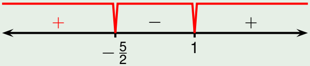

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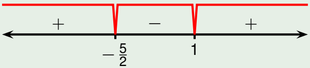

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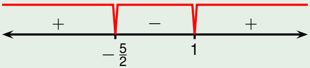

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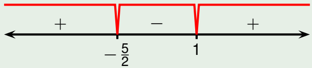

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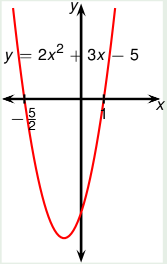

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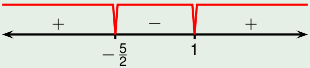

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$$2x^3 - 5x^2 + x + 2 \quad > \quad 0$$

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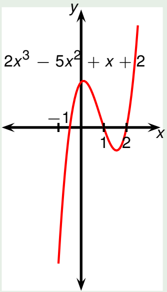

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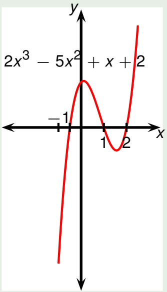

Plot the function $2x^3 - 5x^2 + x + 2$. Solve the inequality.

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$$\textbf{?}\ (x - \qquad)(x - \quad)(x - \quad) \quad > \quad 0$$

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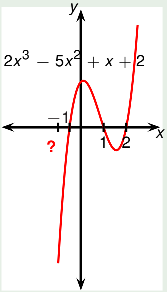
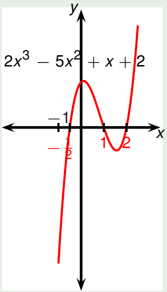


Plot the function $2x^3 - 5x^2 + x + 2$. Solve the inequality.

$$\begin{aligned} 2x^3 - 5x^2 + x + 2 &> 0 \\ \textbf{?}\left(x - \textbf{?} \quad \right)\left(x - \textbf{?}\right)\left(x - \textbf{?}\right) &> 0 \end{aligned}$$

Example



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

$$\textbf{?}\ \left(x - \left(-\frac{1}{2}\right)\right)(x - 1)(x - 2) > 0$$

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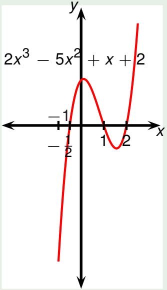

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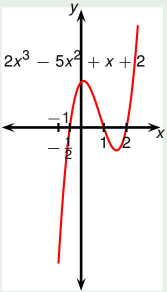

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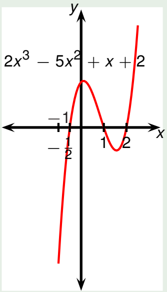

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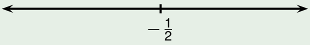
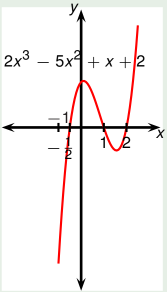


Example



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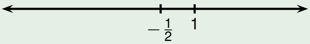
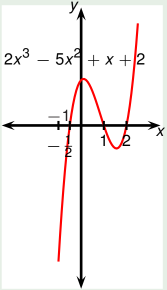


Example



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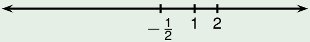
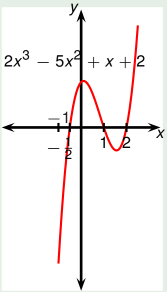


Example



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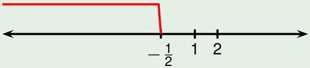
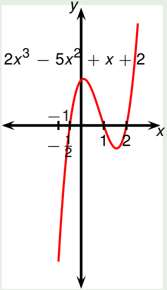


Interval	Factor signs	Final sign from plot
$\left(-\infty, -\frac{1}{2}\right)$		

Example



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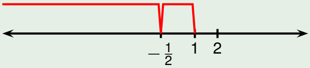

Interval	Factor signs	Final sign from plot
$\left(-\infty, -\frac{1}{2}\right)$		
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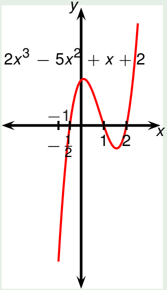
Example



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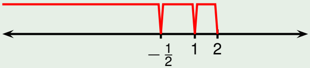

Interval	Factor signs	Final sign from plot
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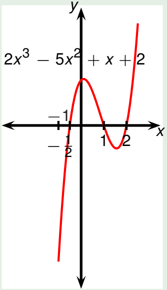
$(1, 2)$		

Example



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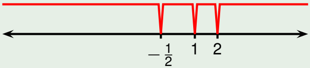

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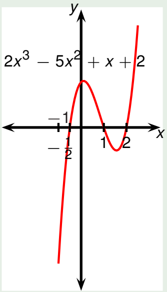
Example



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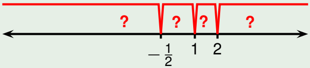
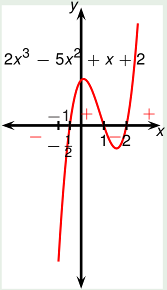


Interval	Factor signs	Final sign from plot
$\left(-\infty, -\frac{1}{2}\right)$	?	?
$\left(-\frac{1}{2}, 1\right)$	?	?
$(1, 2)$	?	?
$(2, \infty)$	?	?

Example



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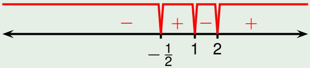
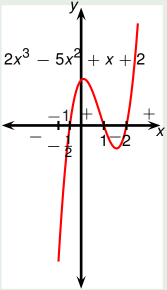


Interval	Factor signs	Final sign from plot
$\left(-\infty, -\frac{1}{2}\right)$	$(-)(-)(-)$	$-$
$\left(-\frac{1}{2}, 1\right)$	$(+)(-)(-)$	$+$
$(1,2)$	$(+)(+)(-)$	$-$
$(2,\infty)$	$(+)(+)(+)$	$+$

Example



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$x \in$ **?**

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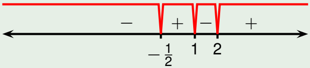

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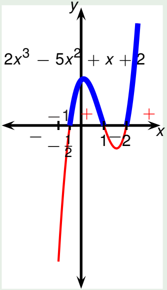
Example



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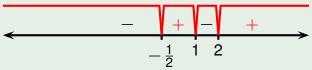

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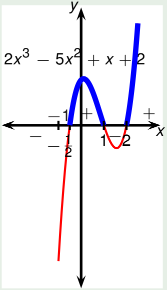

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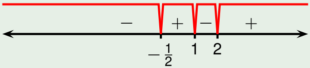

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