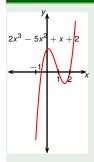
Precalculus Cubic inequality

Todor Milev

2019

Todor Milev Cubic inequality 2019

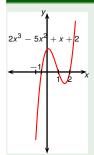
Plot the function
$$2x^3 - 5x^2 + x + 2$$
. Solve the inequality. $2x^3 - 5x^2 + x + 2 > 0$



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2019

Example



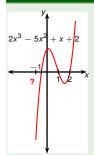
Plot the function $2x^3 - 5x^2 + x + 2$. Solve the inequality.

$$2x^3 - 5x^2 + x + 2 > 0$$
? $(x -)(x -)(x -) > 0$

$$(x-)(x-)(x-) > 0$$

2019

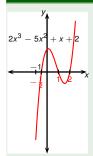
Example



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

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

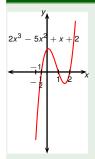
$$2x^3 - 5x^2 + x + 2 > 0$$
? $(x - ?)(x - ?) > 0$



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

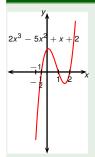
$$2x^3 - 5x^2 + x + 2 > 0$$

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

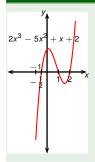


Plot the function $2x^3 - 5x^2 + x + 2$. Solve the inequality. $2x^3 - 5x^2 + x + 2 > 0$

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



Plot the function $2x^3 - 5x^2 + x + 2$. Solve the inequality. $\frac{2}{3}x^3 - 5x^2 + x + 2 > 0$ $\frac{2}{3}(x - (-\frac{1}{2}))(x - 1)(x - 2) > 0$

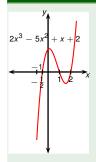


Plot the function $2x^3 - 5x^2 + x + 2$. Solve the inequality. $2x^3 - 5x^2 + x + 2 > 0$

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

Left hand side vanishes when $x = -\frac{1}{2}$, when x = 1 and when x = 2.

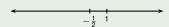


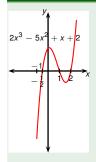


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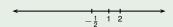


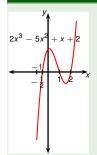


Plot the function $2x^3 - 5x^2 + x + 2$. Solve the inequality. $2x^3 - 5x^2 + x + 2 > 0$

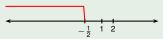
$$2(x-(-\frac{1}{2}))(x-1)(x-\frac{2}{2}) > 0$$

Left hand side vanishes when $x = -\frac{1}{2}$, when x = 1 and when x = 2.

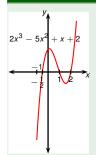




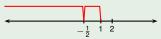
Plot the function $2x^3 - 5x^2 + x + 2$. Solve the inequality. $2x^3 - 5x^2 + x + 2 > 0$ $2(x - (-\frac{1}{2}))(x - 1)(x - 2) > 0$



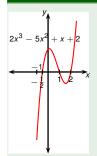
Interval	Factor signs	Final sign from plot
$\left(-\infty,-\frac{1}{2}\right)$		



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

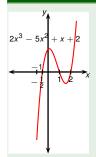


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Left hand side vanishes when
$$x = -\frac{1}{2}$$
, when $x = 1$ and when $x = 2$. The two roots split the real line into four intervals: $(-\infty, -\frac{1}{2})$, $(-\frac{1}{2}, 1)$, $(1, 2)$, $(2, \infty)$.

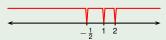


Interval	Factor signs	Final sign from plot
$ \begin{array}{c c} (-\infty, -\frac{1}{2}) \\ (-\frac{1}{2}, 1) \\ (1, 2) \end{array} $		

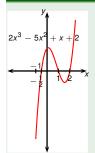


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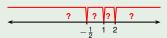
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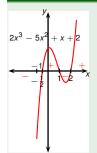
Interval	Factor signs	Final sign from plot
$ \begin{array}{c c} (-\infty, -\frac{1}{2}) \\ (-\frac{1}{2}, 1) \\ (1, 2) \\ (2, \infty) \end{array} $		



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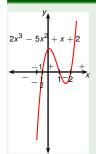
Interval	Factor signs	Final sign from plot
$\left(-\infty,-\frac{1}{2}\right)$?	?
$(-\frac{1}{2},1)$?	?
(1,2)	?	?
$(2,\infty)$?	?



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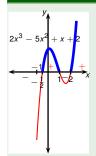
Interval	Factor signs	Final sign from plot
$\left(-\infty,-\frac{1}{2}\right)$	(-)(-)(-)	_
$\left(-\frac{1}{2},1\right)$	(+)(-)(-)	+
(1,2)	(+)(+)(-)	_
$(2,\infty)$	(+)(+)(+)	+



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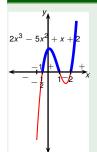
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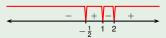
Interval	Factor signs	Final sign from plot
$\left(-\infty,-\frac{1}{2}\right)$	(-)(-)(-)	_
$\left(-\frac{1}{2},1\right)^{-1}$	(+)(-)(-)	+
(1,2)	(+)(+)(-)	_
$(2,\infty)$	(+)(+)(+)	+



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$\left(-\frac{1}{2},1\right)$	(+)(-)(-)	+
(1,2)	(+)(+)(-)	_
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