

$$P(x) = x^3 - 5x^2 - 18x + 72$$

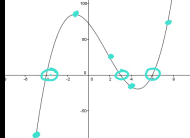
↑
 VARS: VARS: FUNCTION

$$\begin{aligned} P(-5) &= -88 \\ P(-2) &= 80 \\ P(2) &= 24 \\ P(4) &= -16 \\ P(7) &= 44 \end{aligned}$$



X-int b/w -5 & -2
 2 & 4
 4 & 7

Now → look @ graph



Intermediate Value Theorem

$P(-5) = -88$ Because $P(x)$ is continuous
 $P(-2) = 80$ ($P(x)$ is a polynomial), $P(x)$
 take on all values b/w -88
 as x goes from -5 to -2

Does $P(x)$ have a root between 3 and 5?

$$P(x) = x^3 + 2x^2 - 5x + 7$$

$$P(3) = 3^3 + 2 \cdot 3^2 - 5 \cdot 3 + 7$$

$$P(3) = 27 + 18 - 15 + 7 = 37$$

$$P(5) = 5^3 + 2 \cdot 5^2 - 5 \cdot 5 + 7$$

$$= 125 + 50 - 25 + 7$$

$$P(5) = 157$$

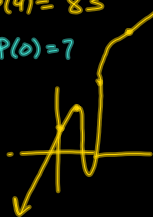
$$P(3) = 37 \quad P(5) = 157$$

$$P(4) = 4^3 + 2 \cdot 4^2 - 5 \cdot 4 + 7$$

$$P(4) = 64 + 32 - 20 + 7$$

$$P(4) = 83$$

$$P(0) = 7$$



Show that $6x^3$ has no extrema.

$$f'(x) = 3x^2$$

$$3x^2 = 0$$

$$x = 0$$

$$f'(x): \begin{array}{c} + \quad | \quad + \\ \hline 0 \end{array}$$

$f'(x)$ has no sign change $\therefore f(x)$ has no extrema

$$P(x) = x^3 + 2x^2 - 5x + 7$$

↑ Find extrema.

$$P'(x) = 3x^2 + 4x - 5$$

$$3x^2 + 4x - 5 = 0$$

$$x = \frac{-4 \pm \sqrt{16 - 4 \cdot 3 \cdot (-5)}}{2 \cdot 3}$$

Exam 1, Spring 2009, Problem 2

Use the Intermediate Value Theorem to show that the function

$$f(x) = xe^{x-1} - \frac{1}{2}$$

has a zero in the interval $[0, 1]$.

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Exam 1, Practice Fall 2009, Problem 5

Use the Intermediate Value Theorem in order to show that the equation

$$x^5 - x + 1 = 0$$

has at least one real solution.

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Exam 1, Spring 2010, Problem 4

Use the Intermediate Value Theorem to show that the equation

$$x^4 = 2^x$$

has at least one solution.