AP Calculus AB
Tuesday, November 12, 2013

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

y_1

VARS: YVARS: FUNCTION

$P(-5) = -88$
$P(-2) = 80$
$P(2) = 24$
$P(4) = -16$
$P(7) = 44$

x-int btn -5 & -2
2 & 4
4 & 7

Now → look at graph

Intermediate Value Theorem

$P(-5) = -88$
$P(-2) = 80$

Because P(x) is continuous (P(x) is a polynomial), P(x) will take on all values btn. -88 & 80 as x goes from -5 to -2

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

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

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

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

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

$= 125 + 50 - 25 + 7$

$P(5) = 157$

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

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

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

$P(4) = 83$

$P(0) = 7$

Show that x^3 has no extrema.

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

$3x^2 = 0$

$x = 0$

$f'(x)$: $+ \mid +$ (0)

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

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

↑ Find extrema.

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

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

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

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.