2.6.41 Establish intervals of continuity of $f(x)=\sqrt{5-x}$

Establish left/right continuity at endpoints of continuity intervals.

Solution: Square root $\sqrt{y}$ is defined for positive y, $y \geq 0$

(State theory)

$5-x \geq 0 \Rightarrow \quad 5 \geq x \iff \quad x \leq 5$ (Carry out calculations)

Interval of continuity is $(-\infty, 5]$ or

$f: (-\infty, 5] \to [0, \infty)$

$\lim_{x \to 5^-} f(x) = 0$ $f(x)$ is continuous at left (State definitions of left/right continuity)

Since for $x > 5$ $5-x < 0$, square root is undefined, function is not continuous at right.

2.6.68. $f(x) = 2x^3 + x - 2 = 0$ $x \in (-1, 1)$

a. Use Intermediate Value Theorem (IVT) (Th 2.16) to show $f(x)=0$ has a solution for $x \in (-1,1)$

IVT states tha if $f: [a,b]$ is continuous and $f(a) < L < f(b)$ then there exists a number c such that $f(c) = L$.

(State theorem)

$f(x) = 2x^3 + x - 2$ is a polynomial, hence continuous

$\lim_{x \to a} f(x) = f(a)$ for all a (Check conditions)

$f(-1) = 2 \cdot (-1)^3 - 1 - 2 = -2-1-2 = -5$

$f(+1) = 2 \cdot (1)^3 + 1 - 2 = 1$

Since $f(-1) = -5 < 0 < 1 = f(1)$

IVT implies existence of c such that $f(c) = 0$

b. Graph the function

https://www.wolframalpha.com/input?i=Plot+2x%5E3%2Bx-2

WolframAlpha com inte

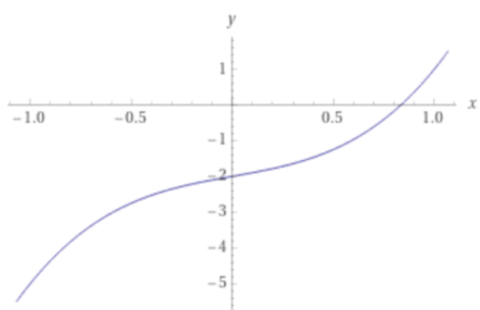
Plot 2x^3+x-2

NATURAL LANGUAGE MATH INPUT EXTENDED KEYBOARD

Input interpretation

plot	$2x^3 + x - 2$

Plots



(x from −1.1 to 1.1)

Solution is at
$x \cong 0.85$

Screen clipping taken: 8/29/2022 5:57 PM