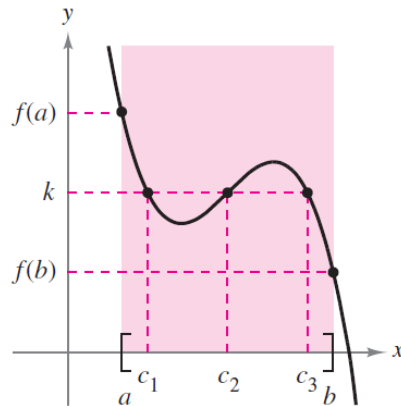


The Intermediate Value Theorem

If $f(x) = x^3 - 2x + 5$, find $f(-4)$ & $f(0)$ and use those values to explain why a zero **MUST** occur in the interval $[-4, 0]$.

The Intermediate Value Theorem

Let $f(x)$ be continuous on $[a, b]$ and let K be some value between $f(a)$ and $f(b)$ then there **MUST** exist an $x \in [a, b]$ such that $f(x) = K$.



f is continuous on $[a, b]$.
[There exist three c 's such that $f(c) = k$.]

So.....**IF** a function is **continuous**, ALL y -values between the **initial y -value** and **ending y -value** **MUST** occur somewhere on the interval of x -values (initial and ending x -values).

Using "big boy" language: All values of the dependent variable will occur on the interval of independent values **IF** the function is continuous on the interval

How the AP test will ask you to use the IVT

EX) Given the function $f(x) = x^3 - 2x + 5$ on the interval $[-4, 0]$ determine if a value of “ c ” exists where $f(c) = -9$ and explain why or why not.

EX) The following chart of data represents the height of a plant on a particular day over a 30 day time period. Is there a time during this 30 day time period where the plant was 8 cm tall? Explain.

Day	4	14	22	34
Height(cm)	6	13	16	25

Watch the following video about another theorem of continuity

[SQUEEZE THEOREM VIDEO](#)

EX) Create two functions with known limits that can be used to prove $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$ using the squeeze theorem.