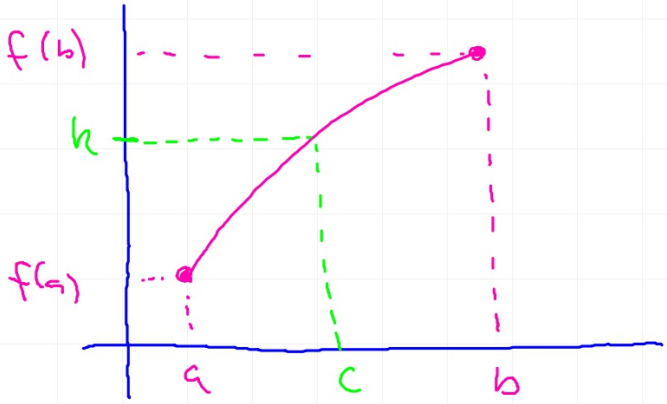
Intermediate Value Theorem

If f is cont on $[a,b]$ then

$\forall\, k \in (f(a), f(b))\ \exists\ c \in (a,b) \ni$

$f(c) = k$.



Given that $f(x) = 2 + x - x^2$ on $[0,3]$ and $k = 1$
find the c guaranteed by IVT.

$2 + x - x^2 = 1 \longrightarrow x = -.618$ or $x = 1.618$

$-.618 \notin (0,3) \therefore c = 1.618.$

Show that $f(x) = x^3 - 2x^2 + x - 5$ has a zero on $[2, 3]$.

Since $f(2) = -3$ and $f(3) = 7$ then by IVT $f(x) = 0$ for some $x \in (2, 3)$.

Show that $x^3 - 2x^2 = 5 - x$ has a root between $x = 2$ and $x = 3$.

Let $f(x) = x^3 - 2x^2 + x - 5$.

$\therefore$ $x^3 - 2x^2 = 5 - x$ has a root between $x = 2$ and $x = 3$.