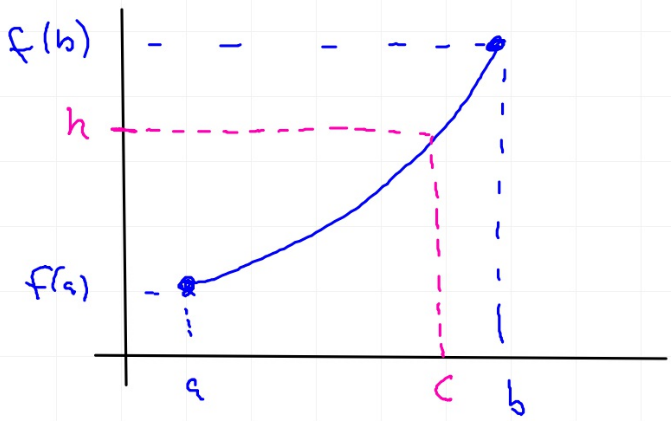
Intermediate Value Theorem

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 $f(x) = 2 + x - x^2$ on $[0,3]$ and $k = 1$

find c such that $f(c) = k$.

$$2 + x - x^2 = 1$$

$$2 + x - x^2 - 1 = 0 \rightarrow x = -.618 \text{ or } x = 1.618$$

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

Use the IVT to show that $f(x) = x^3 - 2x^2 + x - 5$ has a zero on $[2, 3]$.

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

Use the IVT to 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 $x = 3$.