Rolle's Thm

and

Mean Value Thm

Rolle's Theorem

Let *f* be continuous on the closed interval [a,b] and differentiable on the open interval (a,b).

If f(a)=f(b), then there is at least one number, c, in (a,b) such that f'(c)=0.

Find the two x-intercepts and show that $f'(x)=0$ at some point between the x-intercepts.

$$f(x) = x^2 - 3x + 2$$

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

$(x-2)(x-1) = 0$

$x-2=0 \quad x-1=0$

$x = 2, 1$

$(1, 2)$

① find the x-int
- factor
- Quadratic formula

② $f(a) = f(b)$?

$f(1) = 0$

$f(2) = 0$

$\therefore \quad f'(x) = 0$

③ $f'(x)$

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

$2x - 3 = 0$

$x = \frac{3}{2}$

$$f(x)=\frac{x^2-1}{x} \qquad [-1, 1]$$

b/c $\frac{x^2-1}{x}$ is not continuous $[-1, 1]$

We can't conclude anything using Rolle's

Let $f(x) = x^4 - 2x^2$

Find all values of c in the interval (-2,2) such that f'(c)=0.

① f(x) is continuous on [-2,2]

② f(x) is differentiable on (-2,2)

③ $f(-2) = (-2)^4 - 2(-2)^2 = 8$

④ $f(2) = (2)^4 - 2(2)^2 = 8$

f(a)=f(b) ✓

⑤ $4x^3 - 4x = 0$

$4x(x^2 - 1) = 0$

$4x(x+1)(x-1) = 0$

$x = 0, \pm 1$ Values of c where $f'(c) = 0$