

$$7. f(x) = 3x^2 \quad [0, 1]$$

MEAN VALUE THEOREM

① FIND DERIVATIVE

$$f'(x) = 3 \cdot 2x'$$

$$= 6x$$

② FIND  $\frac{f(b) - f(a)}{b - a}$

$$f(b) = f(1) = 3(1)^2$$

$$= 3$$

$$f(a) = f(0) = 3(0)^2$$

$$= 0$$

$$\frac{f(b) - f(a)}{b - a} = \frac{3 - 0}{1 - 0} = 3$$

③ SET DERIVATIVE EQUAL TO VALUE FROM STEP ② AND SOLVE

$$6x = 3$$

$$\frac{6x}{6} = \frac{3}{6}$$

$$x = \frac{1}{2}$$

$$8. f(x) = x^3 - 2x \quad [0, 5]$$

①  $f'(x) = 3x^2 - 2$

②  $f(b) = f(5) = 5^3 - 2(5) = 125 - 10 = 115$

$$f(a) = f(0) = 0^3 - 2(0) = 0$$

$$\frac{f(b) - f(a)}{b - a} = \frac{115 - 0}{5 - 0} = 23$$

③  $3x^2 - 2 = 23$

$$3x^2 = 23 + 2$$

$$3x^2 = 25$$

$$\frac{3x^2}{3} = \frac{25}{3}$$

$$x^2 = \frac{25}{3}$$

$$x = \pm \sqrt{\frac{25}{3}}$$

$$x = \pm \frac{\sqrt{25}}{\sqrt{3}}$$

$$x = \pm \frac{5}{\sqrt{3}}$$

$$x = \pm \frac{5\sqrt{3}}{3}$$

$$x = \frac{5\sqrt{3}}{3}$$