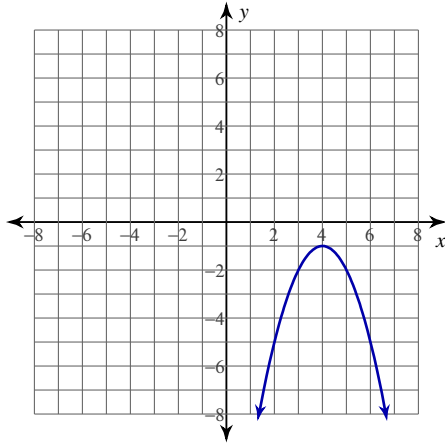


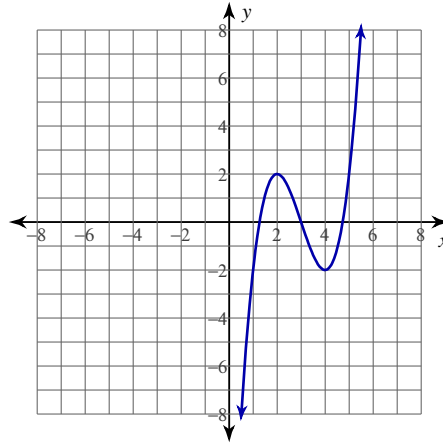
## Mean Value Theorem

For each problem, find the values of  $c$  that satisfy the Mean Value Theorem.

1)  $y = -x^2 + 8x - 17$ ;  $[3, 6]$



2)  $y = x^3 - 9x^2 + 24x - 18$ ;  $[2, 4]$



3)  $y = -\frac{x^2}{2} + x - \frac{1}{2}$ ;  $[-2, 1]$

4)  $y = \frac{x^2}{2} - 2x - 1$ ;  $[-1, 1]$

5)  $y = x^3 + 3x^2 - 2$ ;  $[-2, 0]$

6)  $y = -x^3 + 4x^2 - 3$ ;  $[0, 4]$

7)  $y = \frac{x^2 - 9}{3x}$ ;  $[1, 4]$

8)  $y = \frac{x^2}{2x - 4}$ ;  $[-4, 1]$

$$9) y = -(-2x + 6)^{\frac{1}{2}}; [-2, 3]$$

$$10) y = -(-5x + 25)^{\frac{1}{2}}; [3, 5]$$

**For each problem, determine if the Mean Value Theorem can be applied. If it can, find all values of  $c$  that satisfy the theorem. If it cannot, explain why not.**

$$11) y = -\frac{x^2}{4x + 8}; [-3, -1]$$

$$12) y = \frac{-x^2 + 9}{4x}; [1, 3]$$

$$13) y = -(6x + 24)^{\frac{2}{3}}; [-4, -1]$$

$$14) y = (x - 3)^{\frac{2}{3}}; [1, 4]$$

**Critical thinking question:**

15) Use the Mean Value Theorem to prove that  $|\sin a - \sin b| \leq |a - b|$  for all real values of  $a$  and  $b$  where  $a \neq b$ .