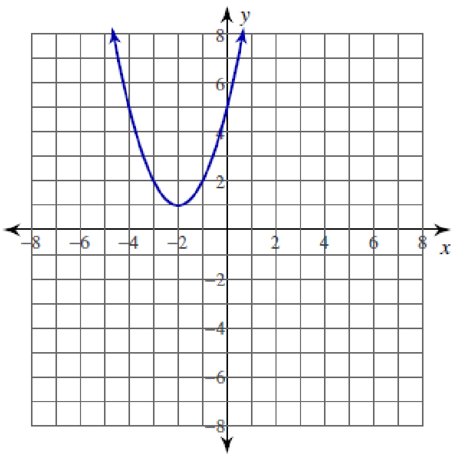
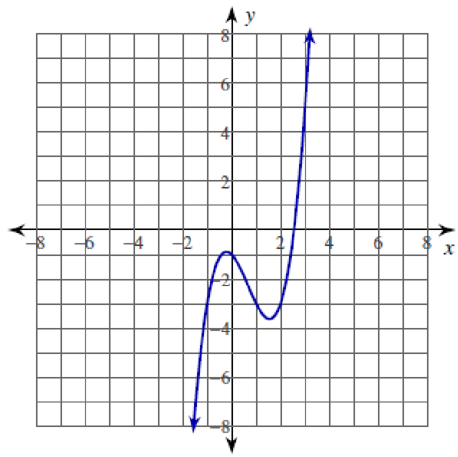
Rolle's Theorem

For each problem, find the values of *c* that satisfy Rolle's Theorem.

1) $y = x^2 + 4x + 5; \quad [-3, -1]$



2) $y = x^3 - 2x^2 - x - 1; \quad [-1, 2]$



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

4) $y = x^3 - 4x^2 - x + 7; \quad [-1, 4]$

5) $y = -x^3 + 2x^2 + x - 1; \quad [-1, 2]$

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

7) $y = \dfrac{-x^2 - 2x + 15}{-x + 4}; \quad [-5, 3]$

8) $y = \dfrac{x^2 - 2x - 15}{-x + 6}; \quad [-3, 5]$

Answers

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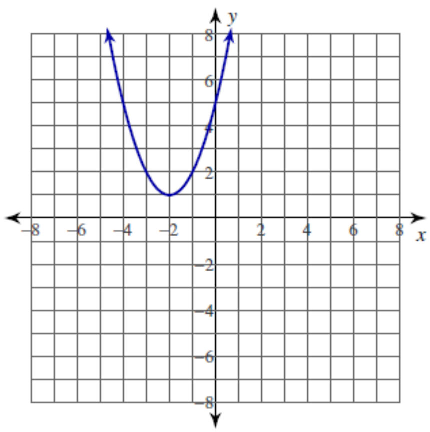
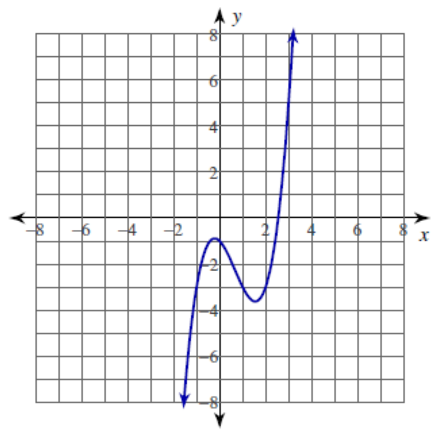


$\{-2\}$

2) $y = x^3 - 2x^2 - x - 1$; $[-1, 2]$



$\left\{\frac{2+\sqrt{7}}{3}, \frac{2-\sqrt{7}}{3}\right\}$

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

$\left\{\frac{2-\sqrt{7}}{3}, \frac{2+\sqrt{7}}{3}\right\}$

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$\left\{\frac{4+\sqrt{19}}{3}, \frac{4-\sqrt{19}}{3}\right\}$

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

$\left\{\frac{1+\sqrt{13}}{3}, \frac{1-\sqrt{13}}{3}\right\}$

7) $y = \frac{-x^2 - 2x + 15}{-x + 4}$; $[-5, 3]$

$\{1\}$

8) $y = \frac{x^2 - 2x - 15}{-x + 6}$; $[-3, 5]$

$\{3\}$

9) $y = \frac{-x^2 + 2x + 15}{x + 4}$; $[-3, 5]$

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

11) $y = -2\sin(2x)$; $[-\pi, \pi]$

12) $y = \sin(2x)$; $[-\pi, \pi]$

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

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

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

15) $y = \frac{-x^2 + 36}{x + 7}$; $[-6, 6]$

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

17) $y = 2\tan(x)$; $[-\pi, \pi]$

18) $y = -2\cos(2x)$; $[-\pi, \pi]$

Answers

9) $y = \frac{-x^2 + 2x + 15}{x + 4}$; $[-3, 5]$

$\{-1\}$

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

$\{3 - \sqrt{6}\}$

11) $y = -2\sin(2x)$; $[-\pi, \pi]$

$\left\{-\frac{3\pi}{4}, -\frac{\pi}{4}, \frac{\pi}{4}, \frac{3\pi}{4}\right\}$

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

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

The function is not continuous on $[-2, 2]$

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The function is not continuous on $[-\pi, \pi]$

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$\left\{-\frac{\pi}{2}, 0, \frac{\pi}{2}\right\}$