

MHF4U: Descartes' Rule of Signs

Determine the possible number of positive real solutions, and the possible number of negative real solutions. State the total possible number of real solutions. Find all real solutions.

1. $x^4 - 5x^2 - 36 = 0$

2. $x^3 + 3x^2 - 14x - 20 = 0$

3. $x^3 - 2x^2 + 3x - 6 = 0$

4. $x^4 - 14x^2 + 45 = 0$

5. $x^4 + 6x^2 + 8 = 0$

6. $x^4 + 3x^2 - 18 = 0$

7. $x^3 - 1 = 0$

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

9. $x^3 - 2x^2 - 3x + 6 = 0$

10. $x^6 - 2x^4 - 4x^2 + 8 = 0$

11. $x^5 + 2x^4 + 11x^3 + 22x^2 + 24x + 48 = 0$

12. $x^6 + 5x^4 - 4x^2 - 20 = 0$

13. $x^6 - x^4 - x^2 + 1 = 0$

14. $x^8 - 26x^4 + 25 = 0$

Solutions

1. Total: 2 Pos: 1 Neg: 1 Real solutions: 3, -3

2. Total: 3, 1 Pos: 1 Neg: 2, 0 Real solutions: -5, $1 + \sqrt{5}$, $1 - \sqrt{5}$

3. Total: 3, 1 Pos: 3, 1 Neg: 0 Real solutions: 2

4. Total: 4, 2, 0 Pos: 2, 0 Neg: 2, 0 Real solutions: 3, -3, $\sqrt{5}$, $-\sqrt{5}$

5. Total: 0 Pos: 0 Neg: 0 Real solutions: none

6. Total: 2 Pos: 1 Neg: 1 Real solutions: $\sqrt{3}$, $-\sqrt{3}$

7. Total: 1 Pos: 1 Neg: 0 Real solutions: 1

8. Total: 3, 1 Pos: 1 Neg: 2, 0 Real solutions: -3, -1, 1

9. Total: 3, 1 Pos: 2, 0 Neg: 1 Real solutions: 2, $\sqrt{3}$, $-\sqrt{3}$

10. Total: 4, 2, 0 Pos: 2, 0 Neg: 2, 0 Real solutions: $\sqrt{2}$, $-\sqrt{2}$

11. Total: 5, 3, 1 Pos: 0 Neg: 5, 3, 1 Real solutions: none

12. Total: 2 Pos: 1 Neg: 1 Real solutions: $\sqrt{2}$, $-\sqrt{2}$

13. Total: 4, 2, 0 Pos: 2, 0 Neg: 2, 0 Real solutions: 1, -1

14. Total: 4, 2, 0 Pos: 2, 0 Neg: 2, 0 Real solutions: 1, -1, $\sqrt{5}$, $-\sqrt{5}$