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11. $x^3 + 6x^2 - 5x - 30 = 0$

$$P = \frac{\pm 1 \pm 30 \pm 2 \pm 15 \pm 5 \pm 6 \pm 3 \pm 10}{\pm 1} = \pm 1 \pm 30 \pm 2 \pm 15 \pm 5 \pm 6 \pm 3 \pm 10$$

Graph it! \rightarrow

$$\begin{array}{r|rrrr} -6 & 1 & 6 & -5 & -30 \\ & \downarrow & -6 & 0 & 30 \\ \hline & 1 & 0 & -5 & 0 \end{array}$$

$$x^2 - 5 = 0$$

$$\sqrt{x^2} = \sqrt{5}$$

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

$$x = -6$$

12. $3x^3 - 18x^2 - 9x + 132 = 0$

$$P = \frac{\pm 1 \pm 132 \pm 2 \pm 66 \pm 4 \pm 33 \pm 6 \pm 22 \pm 3 \pm 44}{\pm 1 \pm 3}$$

$$= \pm 1 \pm 132 \pm 2 \pm 66 \pm 4 \pm 33 \pm 6 \pm 22 \pm 3 \pm 44 \pm \frac{1}{3} \pm \frac{2}{3} \pm \frac{4}{3} \pm 11 \pm \frac{22}{3} \pm \frac{44}{3}$$

Graph it! \rightarrow

$$\begin{array}{r|rrrr} 4 & 3 & -18 & -9 & 132 \\ & \downarrow & 12 & -24 & -132 \\ \hline & 3 & -6 & -33 & 0 \end{array}$$

$$3x^2 - 6x - 33 = 0$$

$$x = \frac{6 \pm \sqrt{36 - 4(3)(-33)}}{2(3)}$$

$$= \frac{6 \pm \sqrt{36 + 396}}{6}$$

$$= \frac{6 \pm \sqrt{432}}{6}$$

$$= \frac{6 \pm \sqrt{144 \cdot 3}}{6}$$

$$= \frac{6 \pm 12\sqrt{3}}{6}$$

$$x = 1 \pm 2\sqrt{3}$$

$$x = 4$$

$$13. \quad 2x^3 - 42x + 40 = 0$$

$$2(x^3 - 21x + 20)$$

$$\frac{p}{q} = \frac{\pm 1 \pm 20 \pm 4 \pm 5 \pm 2 \pm 10}{\pm 1} = \pm 1 \pm 20 \pm 4 \pm 5 \pm 2 \pm 10$$

Graph it! \longrightarrow

$$\begin{array}{r|rrrr} 1 & 1 & 0 & -21 & 20 \\ & \downarrow & 1 & 1 & -20 \\ \hline & 1 & 1 & -20 & 0 \end{array}$$

$$x^2 + x - 20$$

$$(x+5)(x-4)$$

$$\boxed{x = -5 \quad x = 4 \quad x = 1}$$

$$14. \quad x^4 - 9x^2 + 20 = 0$$

$$\frac{p}{q} = \frac{\pm 1 \pm 20 \pm 4 \pm 5 \pm 2 \pm 10}{\pm 1} = \pm 1 \pm 20 \pm 4 \pm 5 \pm 2 \pm 10$$

Graph it! \longrightarrow

$$\begin{array}{r|rrrrr} 2 & 1 & 0 & -9 & 0 & 20 \\ & \downarrow & 2 & 4 & -10 & -20 \\ \hline & 1 & 2 & -5 & -10 & 0 \end{array}$$

$$x^3 + 2x^2 - 5x - 10$$

$$\begin{array}{r|rrrr} -2 & 1 & 2 & -5 & -10 \\ & \downarrow & -2 & 0 & 10 \\ \hline & 1 & 0 & -5 & 0 \end{array}$$

$$x^2 - 5 = 0$$

$$\sqrt{x^2} = \sqrt{5}$$

$$\boxed{x = \pm\sqrt{5} \quad x = 2 \quad x = -2}$$

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$$15. \quad x^3 + 3x^2 - 9x = 27$$

$$x^3 + 3x^2 - 9x - 27 = 0$$

$$x^2(x+3) - 9(x+3) = 0$$

$$(x^2 - 9)(x+3) = 0$$

$$(x+3)(x-3)(x+3) = 0$$

$$x = -3 \quad x = 3 \quad x = -3$$

$$16. \quad 4x^5 - 8x^3 + 4x = 0$$

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

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

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

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

$$17. \quad 10x^3 - 640x = 0$$

$$10x(x^2 - 64) = 0$$

$$10x(x-8)(x+8) = 0$$

$$x = 0 \quad x = 8 \quad x = -8$$

$$18. \quad x^4 - 12x^2 = -36$$

$$x^4 - 12x^2 + 36 = 0$$

$$(x^2 - 6)(x^2 - 6) = 0$$

$$x^2 - 6 = 0$$

$$+6 \quad +6$$

$$\sqrt{x^2} = \sqrt{6}$$

$$x = \pm\sqrt{6} \quad x = \pm\sqrt{6}$$

$$19. \quad 2x^3 - 5x^2 - 4x + 10 = 0$$

$$x^2(2x-5) - 2(2x-5) = 0$$

$$(x^2 - 2)(2x-5) = 0$$

$$x = \pm\sqrt{2} \quad 2x-5 = 0$$

$$2x = 5$$

$$x = 5/2$$

$$20. \quad 4x^3 + 7x^2 - 5x = 6$$

$$4x^3 + 7x^2 - 5x - 6 = 0$$

$$\frac{p}{q} = \frac{\pm 1 \pm 2 \pm 3 \pm 6}{\pm 1 \pm 2 \pm 4} = \pm 1 \pm 2 \pm 3 \pm 6 \pm 1/2 \pm 3/2 \pm 1 \pm 3/4$$

Graph it!

$$\begin{array}{r} -2 \mid 4 \quad 7 \quad -5 \quad -6 \\ \quad \downarrow -8 \quad 2 \quad 6 \\ \quad \hline 4 \quad -1 \quad -3 \quad 0 \end{array}$$

$$4x^2 - x - 3 = 0$$

$$x = \frac{1 \pm \sqrt{1 - 4(4)(-3)}}{2(4)}$$

$$= \frac{1 \pm \sqrt{1 + 48}}{8}$$

$$= \frac{1 \pm \sqrt{49}}{8}$$

$$= \frac{1 \pm 7}{8}$$

$$x = 1, -3/4 \quad x = -2$$



The first part of the document discusses the importance of maintaining accurate records. It emphasizes that proper documentation is essential for ensuring the integrity and reliability of the data collected. This section also touches upon the various methods used to collect and analyze data, highlighting the need for consistency and precision throughout the process.



In the second part, the focus shifts to the practical application of these principles. It provides a detailed overview of the experimental setup and the specific procedures followed during the data collection phase. The text describes the challenges encountered and the strategies employed to overcome them, ensuring that the data obtained is as accurate as possible.



The final section of the document summarizes the key findings and conclusions drawn from the study. It discusses the implications of the results and offers suggestions for future research in this area. The author expresses their appreciation for the support and assistance provided throughout the project.

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24. $x^4 - 3x^2 - 4 = 0$

$$\frac{p}{q} = \frac{\pm 1 \pm 2 \pm 4}{\pm 1} = \pm 1 \pm 2 \pm 4$$

Graph it! \longrightarrow

$$\begin{array}{r|rrrrr} 2 & 1 & 0 & -3 & 0 & -4 \\ & \downarrow & 2 & 4 & 2 & 4 \\ \hline & 1 & 2 & 1 & 2 & 0 \end{array}$$

$$x^3 + 2x^2 + x + 2$$

$$\begin{array}{r|rrrr} -2 & 1 & 2 & 1 & 2 \\ & \downarrow & -2 & 0 & -2 \\ \hline & 1 & 0 & 1 & 0 \end{array}$$

$$x^2 + 1 = 0$$

25. $3x^3 + 4x^2 - 6x - 8 = 0$

$$\frac{p}{q} = \frac{\pm 1 \pm 2 \pm 4}{\pm 1 \pm 3} = \pm 1 \pm 2 \pm 4 \pm \frac{1}{3} \pm \frac{2}{3} \pm \frac{4}{3}$$

Graph it! \longrightarrow

$$\begin{array}{r|rrrr} 4/3 & 3 & 4 & -6 & -8 \\ & \downarrow & 4 & 10^{2/3} & 56/9 \\ \hline & 3 & 8 & 4^{2/3} & -16/9 \end{array}$$

NOT zero!

$$\begin{array}{r|rrrr} -4/3 & 3 & 4 & -6 & -8 \\ & \downarrow & -4 & 0 & 8 \\ \hline & 3 & 0 & -6 & 0 \end{array}$$

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

$$3x^2 = 6$$

$$x^2 = 2$$

$$x = \pm \sqrt{2} \quad x = -4/3$$

$$26. \quad x^4 - 2x^3 - 2x^2 = 0$$

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

$$x = \frac{2 \pm \sqrt{4 - 4(1)(-2)}}{2(1)}$$

$$= \frac{2 \pm \sqrt{4 + 8}}{2}$$

$$= \frac{2 \pm \sqrt{12}}{2}$$

$$= \frac{2 \pm \sqrt{4 \cdot 3}}{2}$$

$$= \frac{2 \pm 2\sqrt{3}}{2}$$

$$x = 1 \pm \sqrt{3} \quad x = 0 \text{ (twice)}$$