Solving Algebraic Equations

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Solving Algebraic Equations

- The solve command is used to solve equations in MATLAB

- E.g., Solve $3x + 6 + 5x + 4 = 0$

  In MATLAB,

  ```
  >> x = solve('3*x + 6 + 5*x + 4 = 0')
  ```

Solving Algebraic Equations

- The syntax is

  solve(‘equation’, ‘variable’)

- E.g.,

  Solve(‘v^2=u^2+2*a*s’ , ’s’)

Quadratic Equations

- Example,

Solve: 1. $3x^2 - x - 3 = 0$

2. $2x^2 - 5x - 3 = 0$

Polynomials

- Solve: 1. $(x+1)^2(x-5)(x+3)=0$

2. $(x-2)(2x^2+5x+3)=0$

Polynomials

- In MATLAB, a polynomial is expressed as a row vector in the form $[a_n\ a_{n-1} \ldots a_1\ a_0]$

  The elements a_i of this vector are the coefficients of the terms of the polynomial in descending order.

Note: terms with zero coefficients must be included.

Polynomials

- Find the roots of the polynomial

$$y = x^4 - 10x^3 + 35x^2 - 50x + 24$$

$$f = x^5 - 7x^4 + 16x^2 + 25x + 52$$

Expansion

- Expand $(2x-4)(2x+4)$

$$\cos(x+y)$$

Factorization

- Factorize $6x^3 + 4x^2 - 16x$

$$x^3 + 2x^2 - 5x - 6$$

Simplifying expressions

Example,

- polynomial expressions
- Trigonometric identities

Can be simplified using the simplify command

Exponential Equations

- Find the value of x if $3^{x+1} = 4^{2x-1}$
- Solve the equation $5^{2x-1} - 6 \cdot 5^{x} + 25 = 0$
- Solve the simultaneous equation

$$3^{x} - 2^{y+2} = 10$$

$$2^{y} - 3^{x-2} = 2$$

Logarithmic Equations

- Solve $\log_{10}\left(x^2-16\right)-\log\left(x+4\right)=4$

Series Representation of Functions