Basic computations

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Basic matlab computation

Exercise 1. Set $x = 3$ and $y = 2$, use matlab to evaluate:

1. $3x^2 - 4y^3$
2. $\dfrac{x^3y^2}{x + 2y}$
3. $\dfrac{y^{-3}}{x^2 - 1}$

Basic matlab computation

Exercise 2. Use matlab to evaluate:

1. $(1+2i)+(2-3i)$
2. $(4-3i)(-3+7i)$
3. $\dfrac{3-4i}{5+9i}$
4. $|3+4i|$
5. $\sqrt{1+2i}$

Basic matlab computation

Exercise 3. Set $x = -22.5°$, and $y = 56.2°$. Evaluate:

$$\frac{\sin(|x| + |y|)}{\sqrt{\cos(|x + y|)}}$$

Exercise 4. Set $a = 1.67$, and $b = 2.812$. Evaluate:

$$\frac{e^{a+b}}{\log(a + b)}$$

Basic matlab computation

Quiz 1. Set $a = 1$, $b = 2$, $c = 3$. Find the roots of

$$ax^2 + bx + c = 0. \text{ (Hint: } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a})$$

Quiz 2. Given the length of the three sides of a triangle, $a = 4.5, b = 7.8, c = 8.9$, calculate the area of this triangle.

Hint: $area = \sqrt{s(s-a)(s-b)(s-c)}$, where $s = (a+b+c)/2$.

Matrix operations

Exercise 5. Given two matrices

$$A = \begin{bmatrix} 3 & 1 & 1 \\ 2 & 1 & 2 \\ 1 & 2 & 3 \end{bmatrix}, B = \begin{bmatrix} 1 & 1 & -1 \\ 2 & -1 & 0 \\ 1 & -1 & 1 \end{bmatrix}.$$ Evaluate:

1. $2A + B$
2. $4A^2 - 3B^2$
3. AB
4. BA
5. $AB - BA$

Matrix operations

Exercise 6. Given two matrices

$$A = \begin{bmatrix} -2 & 5 & -3 \\ 5 & 9 & 12 \\ 7 & 8 & 4 \end{bmatrix}, B = \begin{bmatrix} 3 & -1 & 5 \\ 7 & 2 & -6 \\ 4 & 8 & 3 \end{bmatrix}.$$

Find C and D:

1. $C = A^{-1}B$
2. $D = AB^{-1}$

Matrix operations

Exercise 7. Given three matrices

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}, B = \begin{bmatrix} 3 & 2 & 1 \\ 1 & 3 & 2 \\ 2 & 1 & 3 \end{bmatrix}, I = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}.$$

Execute the following in matlab and discuss the results

```
% matlab code
A+5*I
A*B
A.*B
A./B
A.^B
A.^2
```

Matrix operations

Quiz 3. Solve the following linear system of equations:

$$\begin{cases} 2x_1 - x_2 + x_3 = -5 \\ -3x_1 - 2x_2 + 2x_3 = 4 \\ 4x_1 - 2x_2 - x_3 = 10 \end{cases}$$

Hint: This system can be expressed as $Ax = b$.

Matrix operations

Quiz 4. Suppose matrices A and B satisfy $AB = A + 2B$.

Given $A = \begin{bmatrix} 3 & 2 & 4 \\ 1 & -3 & 2 \\ -2 & 1 & 3 \end{bmatrix}$. Find matrix B.

Compute the LHS and RHS and check whether they are equal.