Sri Lanka Institute of Information Technology
Discrete Mathematics
LabSheet 02
Year 2 , Semester 2

Relational Expressions

Expressions that are true or false (Boolean or logical expressions)

>	Greater than
<	Less than
>=	Greater than or equals
<=	Less than or equals
==	equality
~=	inequality

It will display "1" if a logical expression is true and "0" otherwise.

Exercise 01

Consider the following expressions.

1. 2 < 3
2. 3 > 5
3. 5 >= sqrt(10^2/4)
4. 3 <= 5
5. a = 3 ; b = 27^(1/3);
    1. a <= b
    2. a == b
    3. a > b
6. 2 ~= 4

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Logical Operators

The truth of the boolean expression is computed by combining the truth values of the corresponding elements of the component expressions.

||	OR
&&	AND
~	NOT

Exercise 02

Consider the following expressions.

1. 2 < 3 AND 4 > 7
2. ~(2 < 3) OR 4 == 3
3. p = 2 > 3; q = 4 < 5;

    a. p or q
    b. P and q
    c. ~p
    d. ~q
    e. (~p or q) and q
    f. (p and q) or (~q or p)
    g. p or ~q and (p or q)

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Mathematical Functions

A function is a group of statements that together perform a task. In Octave Functions can accept more than one input arguments and may return more than one output arguments. Octave offers many predefined mathematical functions for technical computing which contains a large set of mathematical functions.

Example:
Sqrt(9) , pi

Custom functions can also be created and each function should be defined in separate script files. The name of the file and of the function should be the same.

Exercise 03

1. Calculate $e^5 \ln 142 + 10 \sqrt{8}$ using built-in Octave functions.
2. Calculate $\sin \llbracket \pi/4 \rrbracket$
3. Write a custom function named quadratic that would calculate the roots of a quadratic equation.

Set Theory

A = [2 4 5];

B = [2 3 7]

- union (A,B)
- intersect (A,B)
- ismember (A,B)

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Exercise 04

1. Write a function to calculate the average (mean) of 5 numbers (X_1 , X_2 ,X_3 ,X_4 ,X_5) without using the built in **mean** function.

$$\text{mean} = \frac{X1 + X2 + X3 + X4 + X5}{5}$$

2. Extend the above function to calculate the mean of any number of given numbers.
3. Find the correlation coefficient given by the following equation for given arrays x & y with equal lengths.

$$\frac{\sum_i x_i y_i - n\bar{x}\bar{y}}{\sqrt{(\sum_i x_i^2 - n\bar{x}^2)(\sum_i y_i^2 - n\bar{y}^2)}}$$