Mathematics and Technology Programming Project

Task Description:

Using Octave or MATLAB, you are asked to write a program related to **Functions, Sequences and Relations**. ****Please include in your project report screenshots of the MATLAB command window.**

Deadline on 2020/12/15 11:59pm

Minimum Requirement for the MATLAB codes

Involves **at least one of** modulus operator function, sequences, relations or matrix.

Involves **at least one of** conditional statements with the if-end structure, if-else-end structure, if-elseif-else-end structure, OR loops including for-end loops or while-end.

Plagiarism

Plagiarism is strictly prohibited, if projects of two persons contain a section of identical MATLAB codes, the scores of the whole project will automatically be zero for the two persons.

Tasks:

1. Assume that the range of a sequence from {1, . . . , n} to the set of real numbers is represented as an array A, indexed from 1 to n.
   a) Write a program that tests whether A is one-to-one.
   b) Write a program that tests whether A is increasing.
   c) Write a program that tests whether A is decreasing.
   d) Write a program that tests whether A is nonincreasing.
   e) Write a program that tests whether A is nondecreasing.
   f) Assume that B is a relational matrix on the set X={1,2,3} to Y={2,3}
   Write a program to determine whether a relation is a function from a set X to a set Y.

2. Assume A is a relational matrix on the set X={1,2,3} with order {1,2,3}
   a) Write a program to determine whether the relation is reflexive.
   b) Write a program to determine whether the relation is antisymmetric.
   c) Write a program to determine whether the relation is transitive.
   d) Write a program that finds the inverse of the relation.
   e) Write a program that finds the composition R◦S of relations R and S.
   f) Write a program that checks whether a relation R is an equivalence relation.

Grading Rubrics

The exploration is assessed against the following two criteria.

Criterion A	Coding
Criterion B	Functionality

Criterion A: Coding (8 marks)

Marks	Description
0	The response does not reach a standard described by the descriptors below.
1–4	The use of codes demonstrates a low level of complexity and ingenuity. It is characterized by limited knowledge of codes. There is no explanation of why the techniques are used or how they are adequate for the task. Sources are used but are not identified.
5–8	The use of techniques demonstrates a high level of complexity and. It is characterized by some appropriate use of existing tools. There is explanations for the techniques used and why they are adequate for the task. All sources are identified.

Criterion B: Functionality (4 marks)

This criterion assesses the extent to which the product functions

Marks	Description
0	The response does not reach a standard described by the descriptors below.
1–2	The presentation demonstrates that the product functions partially.
3–4	The presentation demonstrates that the product functions well.

Mathematics and Technology Essay

Task Description:
Please write an essay of no more than 1200 words on a suitable topic related to Discrete Mathematics related to the modulus operator.

Deadline on 2021/1/5 11:59pm

Plagiarism:
Plagiarism is strictly prohibited, please add in relevant resources and bibliography of your essay.

Suggested Topics:

1. Introduction of Credit Card Number Valid Check Digit
2. Introduction of ISBN valid check digit
3. Introduction of Psuedorandom number

Criterion A: **Communication** (4 marks)

Marks	Description
0	The response does not reach a standard described by the descriptors below.
1–2	The exploration has some coherence and shows some organization.
3-4	The exploration is coherent, well organized, concise and complete.

Criterion B: **Use of mathematics** (4 marks)

This criterion assesses the extent to which the product functions

Marks	Description
0	The response does not reach a standard described by the descriptors below.
1–2	Some relevant mathematics is used. Limited understanding is demonstrated.
3–4	Relevant mathematics commensurate with the level of the course is used. The mathematics explored is mostly correct. Good knowledge and understanding are demonstrated.

Criterion C: **Mathematical presentation** (4 marks)

This criterion assesses the extent to which the product functions

Marks	Description
0	The response does not reach a standard described by the descriptors below.
1–2	There is some appropriate mathematical presentation.
3–4	The mathematical presentation is appropriate throughout.