

Assignment No. 5

EECS 210

Discrete Structures

Due: 11:59 PM, Thursday, October 27, 2022

Submit deliverables in a single zip file to Canvas

Name of the zip file: FirstnameLastname_Assignment5 (with your first and last name)

Name of the Assignment folder within the zip file: FirstnameLastname_Assignment5

Deliverables:

1. Copy of Rubric5.docx with your name and ID filled out (do not submit a PDF).
2. Source code.
3. Screen print showing the successful execution of your code or copy and paste the output from a console screen to a Word document and PDF it.

Assignment:

- You may use any language you want, but if you want help from me or one of the SIs, you should probably use C++ or Python.
- Recall that a function f from A to B , is a relation $f \subseteq A \times B$ such that each element of A is assigned to exactly one element of B .
- Thus, we can represent a function as a relation of order pairs, (a,b) , where $a \in A$, $b \in B$, and $b = f(a)$.
- Write a program that takes inputs of A , B , and a relation f and a) determines if the relation is a function or not, b) and if it is a function, determines if it is injective, surjective, or bijective, c) and if it is bijective, determines the inverse function.
- Your program should print out the inputs using the notation you learned in class, i.e., $A = \{\dots\}$, $B = \{\dots\}$, $f = \{(a,b), \dots\}$, whether the relation is a function or not, b) and if it is a function, whether it is injective, surjective, or bijective, c) and if it is bijective, what is the inverse function. Test your program with the following inputs:
 1. $A = \{a,b,c,d\}$, $B = \{v,w,x,y,z\}$, $f = \{(a,z),(b,y),(c,x),(d,w)\}$
 2. $A = \{a,b,c,d\}$, $B = \{x,y,z\}$, $f = \{(a,z),(b,y),(c,x),(d,z)\}$
 3. $A = \{a,b,c,d\}$, $B = \{w,x,y,z\}$, $f = \{(a,z),(b,y),(c,x),(d,w)\}$
 4. $A = \{a,b,c,d\}$, $B = \{1,2,3,4,5\}$, $f = \{(a,4),(b,5),(c,1),(d,3)\}$
 5. $A = \{a,b,c\}$, $B = \{1,2,3,4\}$, $f = \{(a,3),(b,4),(c,1)\}$
 6. $A = \{a,b,c,d\}$, $B = \{1,2,3\}$, $f = \{(a,2),(b,1),(c,3),(d,2)\}$
 7. $A = \{a,b,c,d\}$, $B = \{1,2,3,4\}$, $f = \{(a,4),(b,1),(c,3),(d,2)\}$
 8. $A = \{a,b,c,d\}$, $B = \{1,2,3,4\}$, $f = \{(a,2),(b,1),(c,2),(d,3)\}$
 9. $A = \{a,b,c\}$, $B = \{1,2,3,4\}$, $f = \{(a,2),(b,1),(a,4),(c,3)\}$
- Provide comments that explain what each line of code is doing. See rubric below.

Rubric for Program Comments		
Exceeds Expectations (90-100%)	Meets Expectations (80-89%)	Unsatisfactory (0-79%)
Software is adequately commented with prologue comments, comments summarizing major blocks of code, and comments on every line.	Prologue comments are present but missing some items or some major blocks of code are not commented or there are inadequate comments on each line.	Prologue comments are missing all together or there are no comments on major blocks of code or there are very few comments on each line.

Adequate Prologue Comments:

- Name of program contained in the file (e.g., EECS 210 Assignment 3)
- Brief description of the program, e.g.:
 - Python code for demonstrating operations on relations and properties of relations.
- Inputs (e.g., none, for a function, it would be the parameters passed to it)
- Output, e.g.,
 - Print out of the name of each exercise, followed by the exercise's output.
- Author's full name
- Creation date: The date you first create the file, i.e., the date you write this comment

Adequate comments summarizing major blocks of code and comments on every line:

- Provide comments that explain what each line of code is doing.
- You may comment each line of code (e.g., using `//`) and/or provide a multi-line comment (e.g., using `/*` and `*/`) that explains what a group of lines does.
- Multi-line comments should be detailed enough that it is clear what each line of code is doing.

Remember:

- Your Programming Assignments are individual-effort.
- You can brainstorm with other students and help them work through problems in their programs, but everyone should have their own unique assignment programs.