SECI1013: DISCRETE STRUCTURE
SEM 1 2023/2024

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Date : 22/11/2023

Marks: 14 3/4 / 15

Question 1 [3 Marks]

Fill in the blank with correct properties that relation could be reflexive/ irreflexive/ symmetric/ anti-symmetric/ transitive. (One answer only)

a. Nothing is related to itself — irreflexive (1m)
b. No one-way streets — symmetric (1m)
c. Whenever there's a roundabout route, there's a direct route — transitive (1m)

3

Question 2 [3 Marks]

Given the relation {(-7,2), (0,4), (2,-1) (-3,0), (-3,3)}

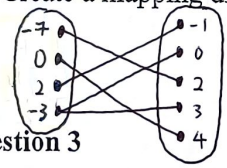
a. State the domain and range of the relation domain = {-7, 0, 2, -3,} range = {-1, 0, 2, 3, 4} (1m)
b. Determine whether the relation is function and explain Not a function because (1m)
c. Create a mapping diagram of the relation domain {-3} duplicate, (1m)
one-to-many is not a function.

3

4

$f(x_1) = f(x_2)$

$x_1 \neq x_2$



Question 3 [6 Marks]

1

$f(n) = \frac{3}{2n+1}$ $g(n) = 3/x$

Given a pair of functions, f(x)=3/(2x+1), g(x)=2/x. Find:

a. (gof)(x) $g(f(n)) = g\left(\frac{3}{2n+1}\right) = \frac{2}{3/2n+1} = \frac{2(2n+1)}{3} = \frac{4n+2}{3}$ (3m) $g(f(n)) = \frac{4n+2}{3}$
b. Domain of function. (3m)

For $f(n) = \frac{3}{2n+1}$ if $n = -\frac{1}{2}$, $f(n) = \frac{3}{2(-\frac{1}{2})+1} = 3/0$ = error

For $g(n) = 2/n$ if $n = 0$, $g(n) = 2/0$ = error

Domain of $f(n) = \frac{3}{(2n+1)}$ is all integers and numbers except $-\frac{1}{2}$.

Domain of $g(n) = 2/x$ is all integers and numbers except 0.

6

Question 4 [3 Marks]

$\frac{35}{7}$,

Given an arithmetic sequence 5, 37/7, 39/7, 41/7 ....

$+\frac{2}{7}$ $+\frac{2}{7}$ $+\frac{2}{7}$

a. Find the sequence recursive formula (1m)
b. Write a Pseudo-code for function a(n) (2m)

3

a) $a_0 = 5 / \frac{35}{7}$.

$a_n = a_{n-1} + \frac{2}{7}$, $n \geq 1$ and $a_0 = 5$.

b) a(n)

```
{ if n = 1
      return 5
  return a(n-1) + 2/7
}
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n = 4
a(3) + 2/7
n = 3
a(2) + 2/7
n = 2
a(1) + 2/7
n = 1
return 5

$a(4) = \frac{39}{7} + \frac{2}{7} = \frac{41}{7}$

$a(3) = \frac{37}{7} + \frac{2}{7} = \frac{39}{7}$

$a(2) = 5 + \frac{2}{7} = \frac{37}{7}$

$a(1) = 5$