SECI1013: DISCRETE STRUCTURE
SEM 1 2023/2024

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Marks 3 / 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)

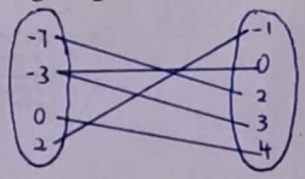
3

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,-3,0,2} range = {-1,0,2,3,4} (1m)
b. Determine whether the relation is function and explain — The relation is not a function (1m)
c. Create a mapping diagram of the relation — since there is one-to-many relation. (1m)

3



Question 3 **[6 Marks]**

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

a. (g∘f)(x)
b. Domain of function.

a) $g(f(x)) = g\left(\frac{3}{2x+1}\right)$

$= \frac{2}{3/2x+1}$

$= \frac{2(2x+1)}{3}$

$= \frac{4x+2}{3}$

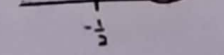
3

(b) $f(x) = \frac{3}{2x+1}$

let $2x+1 = 0$

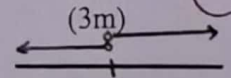
$2x = -1$

$x = -\frac{1}{2}$



domain = $\{(-\infty, -\frac{1}{2}) \cup (-\frac{1}{2}, \infty)\}$

$g(x) = \frac{2}{x}$ (3m) let $x = 0$



(3m)

domain = $\{(-\infty, 0) \cup (0, \infty)\}$

1

Question 4 **[3 Marks]**

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

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

(a) $a_0 = 5$

$a_1 = a_0 + \frac{2}{7}$

$a_2 = a_1 + \frac{2}{7}$

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

with $a_0 = 5$

(b)
```
a(n)
{ if (n = 0)
    return 5
  return a(n-1) + 2/7
}
```

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