SECI1013: DISCRETE STRUCTURE
SEM 1 2023/2024

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Marks 13 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)

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 (1m)
b. Determine whether the relation is function and explain (1m)
c. Create a mapping diagram of the relation (1m)

Question 3 **[6 Marks]**

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

a. (gof)(x) (3m)
b. Domain of function. (3m)

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

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

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

b. domain f(x) = { integer number , real number }

domain g(x) = { integer number , real number } except 0

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

$a_1 = a_0 + \frac{2}{7} = 5 + \frac{2}{7} = \frac{37}{7}$

$a_2 = a_1 + \frac{2}{7} = \frac{37}{7} + \frac{2}{7} = \frac{39}{7}$

$a_3 = a_2 + \frac{2}{7} = \frac{39}{7} + \frac{2}{7} = \frac{41}{7}$

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

2) $\{(-7,2),(0,4),(2,-1),(-3,0),(-3,3)\}$

a. domain = $\{0, 2, -3, -7\}$

range = $\{-1, 0, 2, 3, 4\}$

$f(x_1) = f(x_2)$

$x_1 \neq x_2$

b. the relation is not a function as value of x is repeated. not completed.

c.