SECI1013: DISCRETE STRUCTURE
SEM 1 2023/2024

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Marks: 13/15

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)

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Question 2 [3 Marks]

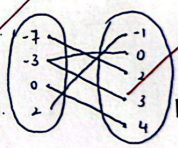
Given the relation {(-7,2), (0,4), (2,-1) (-3,0), (-3,3)}

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)

a. domain = {-7, -3, 0, 2}
range = {-1, 0, 2, 3, 4}

b. Not a function.
Element -3 have more than 1 element in range. one to many relation is not a function.
(-3,0) and (-3,3) ∈ R.

c.



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Question 3 [6 Marks]

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

a. (g∘f)(x) (3m)
b. Domain of function. (3m)

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

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

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

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

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

when $2x+1 = 0$

$2x = -1$

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

domain of function $f(x) = \{(-\infty, -\frac{1}{2}) \cup (-\frac{1}{2}, \infty)\}$

for $g(x) = \frac{2}{x}$

domain of function $g(x)$ is domain $= \{(-\infty, 0) \cup (0, \infty)\}$

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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) $a_0 = 5$

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

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

$\vdots$

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

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

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