7.5

Department of Computer Science FAST NUCES (KARACHI CAMPUS)	CS211 – Discrete Structures Fall 2019 Semester

QUIZ # 2B

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Read Carefully:

- There are **7** Problems and **2** pages. Total Marks are **7.5**.
- Time allowed to complete this quiz is **40** Minutes.
- **WARNING:** Any form of **plagiarism, discussions** or use of **mobile-phones** or other **unfair means** will result in receiving ZERO in the quiz.
- **WARNING: Stop writing** after the allowed time is over. Any submission after the cut-off time will receive ZERO.

Problem#1 **0.5x3**

For each of these relations on the set {1, 2, 3, 4}, decide whether it is reflexive, whether it is symmetric, whether it is antisymmetric, and whether it is transitive.

a) {(1, 2), (2, 3), (3, 4)} Not reflexive, Not symmetric, Antisymmetric, Not Transitive

b) {(1, 1), (2, 2), (3, 3), (4, 4)} Reflexive, Symmetric, Antisymmetric, Transitive

c) {(1, 3), (1, 4), (2, 3), (2, 4), (3, 1), (3, 4)} Not Reflexive, Not Symmetric, Not Antisymmetric, Not Transitive (None).

0.5 0.5 0.5

Problem#2 **0.5x2**

Determine whether the relation R on the set of all integers is reflexive, symmetric, antisymmetric, and/or transitive, where $(x, y) \in R$ if and only if

a) $x \equiv y \pmod 7$. Reflexive, Symmetric, Transitive.

b) x is a multiple of y. Reflexive, Transitive, Antisymmetric

0.5 0.5

Problem#3 **0.5 + (0.25x5)**

a) List the ordered pairs in the relations on {a, b, c, d} corresponding to these matrices. {(a,c) (b,a) (c,d) (d,b)}

b) Determine whether the relation represented by the matrices are

	a	b	c	d
a	0	0	1	0
b	1	0	0	0
c	0	0	0	1
d	0	1	0	0

Type	Reason
reflexive	No, as the diagonal doesn't contain all 1's e.g (a,a) (b,b)...
irreflexive	Yes, as there isn't any single 1 in the diagnal (all are zero).
symmetric	No, counter example (a,c) exists but (c,a) doesnot in matrix.
antisymmetric	Yes the matrix dosn't have any possible symmetry e.g (a,c) (c,a) doesn't exist.
transitive	No, (a,c) (c,d) but no (a,d)

0.5 + 0.25

Problem#4 **1x1**

Decrypt the message "Mxolxv Fdhvdu." that was encrypted using the shift cipher with $k = 3$.

12 23 14 11 23 21

TULIUS 9 20 11 8 20 18

5 3 7 21 3 20

2 0 4 18 0 17 JULIUS CAESAR. 1ns

Problem#5 **1x1**

Solve the linear equation for x. $3x \equiv 4 \pmod 7$.

$3x \equiv 4 \bmod 7$ 3, 7 relatively prime

$\gcd(7,3) = 1$

$7 = 3*2 + 1$ $7 - 3*2 = 1$

$3 = 1*3 + 0$ inverse of $3 = -2$

$-2 \times 3x \equiv 4x - 2 \bmod 7$ $x \equiv -8 \pmod 7$

$1x = 6$

Problem#6 **1x1**

Find the inverse of 3 mod 7.

$\gcd(7,3) = 1$

$7 = 3*2 + 1$ $7 - 3*2 = 1$

$3 = 1*3 + 0$ $-2(3) + (1)7 = 1$

inverse of $3 = -2$.

Problem#7- Undertaking **0.25x1**

I pledge on my honour that I have not given or received any unauthorized assistance on this assignment/quiz. I understand that if I do so, my quiz will be cancelled.

Signatures:

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