① Use the Proof by Contradiction to Prove that if $\sqrt{3}$ is irrationalnumber.

① $\sqrt{3} = \frac{a}{b}$ a, b hasn't Comman factor

② $a = \sqrt{3}b$

$a^2 = 3b^2$ ∴ a^2 able to devide by 3

∴ a " " " " 3

∴ $a = 3L$ with susbitude in ②

$3L = \sqrt{3}b$ ∴ b able to devide by 3 in ②

$9L^2 = 3b$ ∴ $b = 3m$

$3L^2 = b$

$\sqrt{3} = \frac{3L}{3m}$ ∴ by contradiction $\sqrt{3}$ is rationalnumber

① Use mathematical induction to 7^n-1 is divisible by 6 for $n=1,2,3,\dots$

→ ① $\boxed{n=1}$ $S_n = 7^n - 1$

$S_1 = 7^1 - 1 = 6$ is divisible by 6

→ ② suppose that 7^2-1 is divisible by 6 Let

→ ③ at $n+1$, S_{n+1}

$= 7^{n+1}-1$ is divisible 6

$(7^n \cdot 7 - 1) - 6 + 6 = 7^n \cdot 7 - 7 + 6$

$7(7^n-1)+6$ → is divisble by 6

from 2 is divisble by 6

② for the relation R on $X = \{1, 2, 3, 4\}$ defined by the rule $(x, y) \in R$, $x - 1 \leq y$.

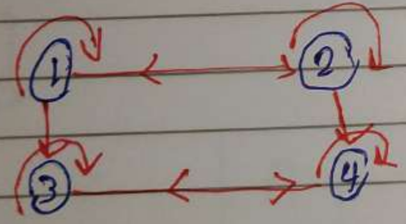
① Find R ② Give the graphical representation

③ Give the matrix representation of R

④ identify that if R is reflexive, symmetric or transitive

① $R = \{(1,1), (1,2), (1,3), (1,4), (2,1), (3,2) (4,3), (2,3)$
$(3,3), (4,4), (3,4), (2,4)\}$

②



③
$$\begin{array}{c c} & \begin{matrix} 1 & 2 & 3 & 4 \end{matrix} \\ \begin{matrix} 1 \\ 2 \\ 3 \\ 4 \end{matrix} & \begin{pmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 \end{pmatrix} \end{array}$$

④ R is reflexive, not symmetric, not transy

الدرجة

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Suez Canal University

Faculty of Computers & Informatics

Summer Semester: First Level

Date: 20-8-2023: Time: 1.5h

الاسم كاملا باللغة العربية ....

Mid-Term Exam (10/30) + Academic Assignments (15/30)

Mid-Term Exam of Discrete Math for Summer Course (BSD-103)

Module-B

Module-B

First Question (15 Marks)

- Use mathematical induction to $7^n - 1$ is divisible by 6 for $n = 1, 2, 3, \ldots$

- For the relation R on $X = \{1, 2, 3, 4\}$ defined by the rule $(x, y) \in R,\ x - 1 \le y$.

① Find R ② Give the graphical representation

③ Give the matrix representation of R ④ identify that if R is reflexive, symmetric or transitive.

استخدم جانبي الورقة عندما يتطلب الأمر

Second Question (12 Marks)

❶ Use the proof by contradiction to prove that if $\sqrt{3}$ is irrational number

❷ Let $S_n = \{k\, n^{n+1} \mid k = 0, 1, 2\}$, find $\bigcup_{n=0}^{2} S_{n+1}$

❸ Prove that $A - \overline{B} = A \cap B$, Then verify your answer by the truth table.

انتهت الأسئلة

Ass. Prof. Yasser M Hamada

② let $S_n = [Kn^{n+1} \mid K = 0,1,2]$ find $\bigcup_{n=0}^{2} S_{n+1}$

$$\bigcup_{n=0}^{2} S_{n+1} = S_1 \cup S_2 \cup S_3$$

? ? ?

$n = 0,1,2$

$$S_1 = \{K(1)^{1+1} \mid K = 0,1,2\} = \{K \mid K = 0,1,2\}$$

$$= \{0,1,2\}$$

$$S_2 = \{K(2)^{2+1} \mid K = 0,1,2\} = \{8K \mid K = 0,1,2\}$$

$$S_2 = \{0,8,16\}$$

$$S_3 = \{K(3)^{3+1} \mid K = 0,1,2\} = \{81K \mid K = 0,1,2\}$$

$$S_3 = \{0,81,162\}$$

$$\therefore S_1 \cup S_2 \cup S_3 = \{0,1,2,8,16,81,162\}$$

③ Prove that $A - \bar{B} = A \cap B$, Then verify your answer by The imath Table

$L.H.S = A - \bar{B} = \{x \mid (x \in A) \wedge (x \notin \bar{B})\}$

$= \{x \mid (x \in A) \wedge (x \in B)\}$

$\bar{B} = x \in B$

$= \{x \mid x \in (A \cap B)\}$

A	B	$\bar{B}$	$A - \bar{B}$	$A \cap B$
1	1	0	1	1
1	0	1	0	0
0	1	0	0	0
0	0	1	0	0