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Fall 2021 MTH001: Elementary Mathematics

Assignment No. 1 (Lectures # 1 to 10) Total Marks: 30

Due Date: Thursday, December 23, 2021

Please read the following instructions carefully before attempting the solution of this assignment:

(1) To solve this assignment, you should have good command over **1 to 10 lectures**.

(2) Try to consolidate your concepts that you learn in the lectures with these questions.

(3) **Upload your assignment properly through VULMS.** No Assignment will be accepted through emails.

(4) First of all, you should download the uploaded question file. Next, solve the given questions (i.e. type the solution) on it. Finally, **submit** your own solution file in VULMS.

- Understand the problem then solve it according to the statements (requirements) of the questions.
- If you do not solve the questions by the method that is asked (required) in the problems then the marks will be deducted (or could be zero).

(5) Do not use colorful backgrounds in your solution files.

- All the students are directed to use the font and style of text as is used in this document i.e. the font size/style should be preferably 12 Times New Roman with black font color.
- The assignments should be zoomed in at 100%.

(6) Use MathType or Equation Editor etc. for writing the proper mathematical symbols/expressions and equations.

- In MS-Word, to type an equation from scratch, press **Alt +=** on your keyboard or choose **Insert --> Equation** and select **Insert New Equation** from the bottom of the built in equation gallery. This inserts an equation placeholder where you can type your equation. It is recommended to visit the following link for more detail:
- https://support.microsoft.com/en-us/office/write-an-equation-or-formula-1d01cabc-ceb1-458d-bc70-7f9737722702#ID0EAACAAA=Write_new_equation
- Remember that you are supposed to submit your assignment only in the MS-Word format, any other format like scanned, images, PDF, MS-Excel, HTML etc. will not be accepted.
- Corrupt files will be given zero marks.

(7) This is an individual assignment (not a group assignment). So keep in mind that you are supposed to submit your own, self-made and different assignments even if you discuss the questions with your class fellows. All the similar assignments (even with some meaningless modifications) will be awarded zero marks and no excuse will be accepted. This is your responsibility to keep your assignment safe from others.

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- **Up to 50% marks might be deducted for those assignments which are received after the due date.**

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Question: 1 **Marks: 15**

Let a set $A = \{a, b, c\}$ and $R = \{(a, a), (a, c), (b, c), (c, c), (b, b), (a, b)\}$ be a relation on A. Then:

(i) Construct a matrix of R.

(ii) Check whether R is a reflexive, a symmetric, or a transitive relation. Justify your answer with proper reasoning.

Solution:

Type your solution here.

Type your solution here.

(i) Matrix form:

$$M = \begin{array}{c} \\ a \\ b \\ c \end{array} \begin{array}{c} \begin{array}{ccc} a & b & c \end{array} \\ \begin{bmatrix} 1 & 1 & 1 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix} \end{array}$$

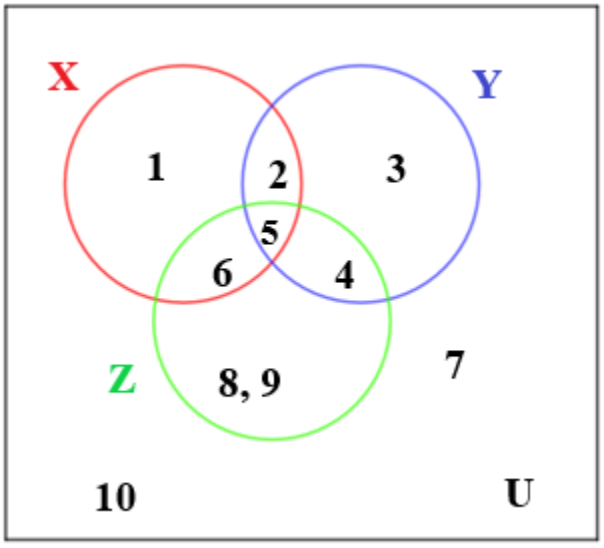
(ii)

- R is reflexive because (a,a)∈R, (b,b)∈R and (c,c)∈R.
- R is not symmetric because (a,c)∈R but (c,a)∉R.
  similarly (b,c)∈R but (c,b)∉R also (a,b)∈R but(b,a)∉R.
- R is transitive because (a,b)∈R, (b,c)∈R also (a,c)∈R.

Question: 2 **Marks: 15**

In the following Venn diagram, find the sets that are given below:

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(I) $X - Y$ or $X \backslash Y = ?$
(II) $Y - Z = ?$
(III) $Z - X = ?$
(IV) $[(X \cup Y) \cap Z]^c = ?$
(V) $X \cap (Y \cap Z) = ?$

Solution:

Type your solution here.

Type your solution here.

$X = \{1, 2, 5, 6\}$

$Y = \{2, 3, 4, 5\}$

$Z = \{4, 5, 6, 8, 9\}$

$U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

(I) $X - Y$ or $X \backslash Y = ?$

$X - Y = \{1, 2, 5, 6\} - \{2, 3, 4, 5\}$

$X - Y = \{1, 6\}$

(II) $Y - Z = ?$

$Y - Z = \{2, 3, 4, 5\} - \{4, 5, 6, 8, 9\}$

$Y - Z = \{2, 3\}$

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(III) $\mathbf{Z - X = ?}$

$Z - X = \{4,5,6,8,9\} - \{1,2,5,6\}$

$Z - X = \{4,8,9\}$

(IV) $\mathbf{[(X \cup Y) \cap Z]^c = ?}$

$X \cup Y = \{1,2,5,6\} \cup \{2,3,4,5\}$

$X \cup Y = \{1,2,3,4,5,6\}$

$(X \cup Y) \cap Z = \{1,2,3,4,5,6\} \cap \{4,5,6,8,9\}$

$(X \cup Y) \cap Z = \{4,5,6\}$

$[(X \cup Y) \cap Z]^c = U - [(X \cup Y) \cap Z]$

$[(X \cup Y) \cap Z]^c = \{1,2,3,4,5,6,7,8,9,10\} - \{4,5,6\}$

$[(X \cup Y) \cap Z]^c = \{1,2,3,7,8,9,10\}$

(V) $\mathbf{X \cap (Y \cap Z) = ?}$

$Y \cap Z = \{2,3,4,5\} \cap \{4,5,6,8,9\}$

$Y \cap Z = \{4,5\}$

$X \cap (Y \cap Z) = \{1,2,5,6\} \cap \{4,5\}$

$X \cap (Y \cap Z) = \{5\}$