MATH18584 Fundamentals of Computer Mathematics

- Assignment #3
- This assignment will be graded out of 40
- This assignment is to be completed individually. Assignments copied in whole or in part will receive a grade of ZER0.
- You must show your work for full marks!

- Answers may only be submitted in the following formats:
  - Microsoft Word Document (.docx)
  - Adobe PDF Document (.pdf)
  - Do not submit external links. Scanned documents need to be legible and in pdf format.

1. List all the members of set A.

   $A = \{x \mid -1 < x \leq 2, x \in Z\}$ Write the power set of A. **(2 marks)**

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

   $P(A) = \{\varnothing, \{1\}, \{2\}, \{1, 2\}\}$

2. Let U = {0,1,2,3,4,5,6,7,8,9,10}, A = { 0, 2, 4, 6, 8, 10}, B= { 0, 1, 2, 3, 4, 5, 6} and C = {4, 5, 6, 7, 8, 9, 10}
   Evaluate and show all your work. **(2 marks each)**

   a. $\overline{(A \cup B)}$

   $\overline{A \cup B} = \{7, 9\}$

   b. $\bar{A} \cap \bar{C}$

   $\bar{A} \cap \bar{C} = \{1, 3\}$

   c. $A - C$

   $A - C = \{0, 2\}$

3. Solve level-2 OR level-3 questions in the below interactive resource and attach a screenshot of the solved page in your answer sheet.

https://www.transum.org/Maths/Activity/Venn/Exercise.asp?Level=2 **(4 marks)**

4. State the domain and range for the following relation, and state if it is a function. **(3 marks each)**

a. $\{(-5,4), (-4,-1), (-2,1), (0,4), (1,3)\}$

Domain: $D = \{-5, -4, -2, 0, 1\}$

Range: $R = \{5\}$

Function?

Yes, it is a function.

b. $\{(-3,-4), (-1,2), (0,0), (-3,5), (2,4)\}$

Domain: $D = \{-3, -1, 0, -3, 2\}$

Range: $R = \{9\}$

Function?

No, it is not a function

5. Determine the domain and range of each of the following function. **(2 marks each)**

a. $y = \sqrt{2x+1}$ $D = \{-\frac{1}{2}, \infty\}$ $R = \{0, \infty\}$

b. $y = \frac{1}{x+4}$ $D = \{R - \{-4\}\}$ $R = \{R - \{0\}\}$

6. The Ace Telephone Co. charges a flat monthly fee of $20.00 for a telephone line and $0.22 per minute for long distance calls.

a. Write an equation that will relate the total cost per month, **C**, to the number of minutes, ***m***, of long distance calls that you make. **(2 marks)**

$C(m) = 0.22m + 20$

b. If you make 25 minutes of long distance calls per month, what will it cost? **(2 marks)**

$C(25) = 0.22(25) + 20$

$= \$25.5$ ∴ LD costs $25.5.

7. List the first four terms of the following sequence, beginning with n=0. **(2 marks)**

$$A_n = \frac{(-1)^{n+1}}{(2n+1)!}$$

$A_n = 1, \frac{1}{6}, \frac{1}{120}, \frac{1}{5040}$

8. Evaluate the following summation: **(3 marks each)**

a. $\sum_{n=1}^{5}(-1)^{n+1}(2n)$

$= 2 + (-4) + 6 + (-8) + 10$

$= 6$

b. $\sum_{i=5}^{10} 3(-2)^i$

$= (-96) + (-192) + (-384) + (-768) + (-1536) + (-3072)$

$= -6048$

9. Take any one real life application scenario like networking in Facebook, Twitter etc.; movie surfing in Netflix... Construct the graph model and explain the associated terms like type of graph, vertex set, edge set, degree etc. **(6 marks)**

Twitter - Directed Multigraph

edge = {{P1, P2}{P1, P3}{P1, P6}{P1, P5}{P1, P4}{P1, P7}}

V = {P1, P2, P3, P4, P5, P6, P7, P8, P9}