

1. (20%) For $A = \{a, b, c, \{d\}, e\}$ and $B = \{a, b, \{a, b\}, d\}$ determine
 - (a) The number of subset of A
 - (b) The number of subset of A containing 3 elements and including the element "a"
 - (c) $\{d\} \in A$? (yes or no)
 - (d) $\{a, b\} \subset B$? (yes or no)

2. (20%) For $X = \{1, 2, 3, 4\}$, $Y = \{a, b, c, d, e, f\}$
 - (a) The number of the relations from X to Y.
 - (b) How many functions $f: X \rightarrow Y$ are **one to one**?
 - (c) How many functions $f: X \rightarrow Y$ are **onto**?
 - (d) How many functions $g: Y \rightarrow X$ are **onto**?

3. (10%) Prove that if we select 14 integers from the set $S = \{1, 2, 3, \dots, 25\}$, there are at least two whose sum is 26.

4. (10%) $A = \{a, b, c\}$, $R_1 = \{(1,1), (2,2), (3,3), (3,2)\}$,
 - (a) Is R_1 reflexive relation on A? (yes or no)
 - (b) Is R_1 symmetric relation on A? (yes or no)

5. (10%) $f(x) = \frac{2x+1}{25}$, $x = 0, 1, 2, 3, 4$

Find $P(1 \leq X < 3)$

6. (10%) $A = \begin{pmatrix} 2 & 5 & 4 \\ 3 & 1 & 2 \\ 5 & 4 & 6 \end{pmatrix}$, find $\det(A)$

7. (20%) $A = \begin{pmatrix} 3 & 2 \\ 3 & -2 \end{pmatrix}$, find eigenvalues of A , $\lambda_1 = \underline{\hspace{1cm}}$ $\lambda_2 = \underline{\hspace{1cm}}$