POSET and Functions

1. Given A = {1, 2, 3, 4} and B = {x, y, z}. Let R be the following relation from A to B: R = {(1, y), (1, z), (3, y), (4, x), (4, Z)}
    a. Determine the matrix of the relation.
    b. Draw the arrow diagram of R.
    c. Find the inverse relation K1 of R.
    d. Determine the domain and range of R.
2. Let

   $\text{Let } f : R \to R,\ f(x) = x^2 - 1,\ g(x) = 4x^2 + 2 \text{ find (i) } f \circ (g \circ f) \text{ (ii) } g \circ (f \circ g)$
3. Solve Recurrence relation

   $a_n = 4\,(a_{n-1} - a_{n-2}) \text{ where } a_0 = 1,\ a_1 = 1.$
4. Show that the function $f : R - \{2\} \to R - \{0\}$ where R is set of real numbers defined by $f(x) = \frac{1}{x-2}$ is a bijection. Find its inverse.
5. Determine the Hasse diagram of the relation on A ={ 1, 2, 3, 4, 5 }

$$M_R = \begin{bmatrix} 1 & 0 & 1 & 1 & 1 \\ 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$