TUTORIAL7: FUNCTIONS

1. Let A = {a, b, c, d} and B = {1, 2, 3, 4}. Identify either relation R from A to B is a function or not. If it is a function, give its range. Identify either it is onto and/or one-to-one.

a) R = {(a, 1), (b, 2), (c, 1), (d, 2)}

b) R = {(a, 1), (b, 2), (a, 2), (c, 1), (d, 2)}

c) R = {(a, 3), (b, 2), (c, 1))

d) R = {(a, 2), (b, 4), (c, 4), (d, 3), (c, 1)}

e) R = {(a, 4), (b, 3), (c, 2), (d, 1)}

f) R = {(a, 1), (b, 1), (c, 3), (d, 1)}

g) R = {(a, 3), (b, 2), (d, 1)}

h) R = {(a, 1), (b, 1), (c, 1), (d, 1)}

2. Let A = B = C = R (real numbers) and let *f*: A → B, g: B → C is explained as $f(a) = 3 + a^2$ and $g(b) = b(b + 2)$. Find:

a) $(g \circ f)(-2)$

b) $(f \circ g)(-3)$

c) $(g \circ f)(1)$

d) $(f \circ g)(2)$

d) $(g \circ f)(x)$

e) $(f \circ g)(x)$

f) $(f \circ f)(y)$

h) $(g \circ g)(y)$

3. Let A = {1, 2, 3, 4, 5, 6} and

$P_1 = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 3 & 4 & 1 & 2 & 6 & 5 \end{bmatrix}$ $P_2 = \begin{bmatrix} 1` & 2 & 3 & 4 & 5 & 6 \\ 2 & 3 & 1 & 5 & 4 & 6 \end{bmatrix}$ $P_3 = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 6 & 3 & 2 & 5 & 4 & 1 \end{bmatrix}$

Find all these:

a) P_1^{-1} b) $P_3 \circ P_1$ c) $(P_2 \circ P_1) \circ P_2$ d) $P_1 \circ (P_3 \circ P_2^{-1})$

e) P_3^{-1} f) $P_1^{-1} \circ P_2^{-1}$ g) $(P_3 \circ P_2) \circ P_1$ h) $P_3 \circ (P_2 \circ P_1)^{-1}$

4. Let A = {a, b, c, d, e, f, g}. Find (f, g) ∘ (b, c, f) ∘ (a, b, c)

5. Let A = {1, 2, 3, 4, 5, 6, 7, 8}. Find the questions below, put it into transposition product and identify either it is an even or odd permutation.

a) (1, 4) ∘ (2, 4, 5, 6) ∘ (1, 4, 6, 7)

b) (5, 8) ∘ (1, 2, 3, 4) ∘ (3, 5, 6 7)

6. Write the matrix below as joint cycle (cyclic redundancy), get its transposition product and identify either it is an even or odd permutation.

a) $P_1 = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\ 4 & 3 & 2 & 5 & 1 & 8 & 7 & 6 \end{bmatrix}$ b) $P_2 = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\ 2 & 3 & 4 & 1 & 7 & 5 & 8 & 6 \end{bmatrix}$