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Matric NO: A20 MJ4005

Assignment: 1(b)

①

a) Not a function because the element "2" is mapped to more than one value in B

b) Bijective function:

as every element of A has a unique image in B and every element of B is mapped to at most one element in A

② a)

$f(x) = 2x \bmod 5$

Now,

$f(0) = 0 \bmod 5 = 0$

$f(1) = 2 \bmod 5 = 2$

$f(2) = 4 \bmod 5 = 4$

$f(3) = 6 \bmod 5 = 1$

$f(4) = 8 \bmod = 3$

$f = \{(0,0), (1,2), (2,4), (3,1), (4,3)\}$

b) yes, f is an one to one fuction because everey element in the coang is mapped to at most one element of of domain.

c) yes, f is an onto function because everey element in the coang is mapped to at least one element in the domain.

(3)

a) $f(x) = 4x^3 - 5$

Now, $(y, x) \in f(y)$, $f^{-1}(y) = x$

$(x, y) \in f$, $y = 4x^3 - 5$

$\Rightarrow y + 5 = 4x^3$

$\Rightarrow \frac{y+5}{4} = x^3$

$\Rightarrow x = \left(\frac{y+5}{4}\right)^{\frac{1}{3}}$

$\Rightarrow f^{-1}(y) = \left(\frac{y+5}{4}\right)^{\frac{1}{3}}$

b) $f(x) = 7 + \frac{1}{x}$

$(y, x) \in f^{-1}(y)$, $f^{-1}(y) = x$

$(x, y) \in f$, $y = 7 + \frac{1}{x}$

$\Rightarrow y - 7 = \frac{1}{x}$

$\Rightarrow x = \frac{1}{y-7}$

$\Rightarrow f^{-1}(y) \frac{1}{y-7}$

④

a) $f(n) = 2n+1$

$fof = f(f(n))$

$= 2(2n+1)+1$

$= 4n + 2 + 1$

$= 4n + 3$

b) $g(n) = 3n - 1$

$g \circ f = g\,f(n)$

$= g(2n+1)$

$= 3(2n+1) - 1$

$= 6n + 3 - 1$

$= 6n + 2$

(5)

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S(n)
{ if (n==1)
    return 1
  return S(n-1) + n^2
}
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$S(4) = S(3) + 4^2$

$S(4) = S(2) + 3^2$

$S(2) = S(1) + 2^2$

$\Rightarrow S(2) = 1 + 2^2$

$\Rightarrow S(3) = 1 + 2^2 + 3^2$

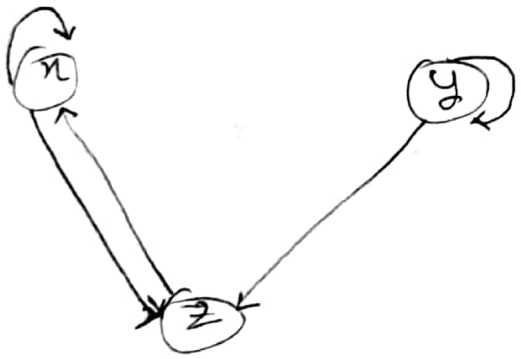
$\Rightarrow S(4) = 1 + 2^2 + 3^2 + 4^2 = 30$

(6)

a) $R = \{(4,2), (5,3), (6,4)\}$

b) $R = \{(5,4), (5,3), (5,2), (6,4), (6,3), (6,2)$
$(7,4), (7,3), (7,2)\}$

(7)



(8)

$$M_R = \begin{array}{c} \\ x \\ y \\ z \end{array} \begin{array}{c} \begin{array}{ccc} x & y & z \end{array} \\ \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \end{bmatrix} \end{array}$$

(9)

$R = \{(a,b), (b,b), (c,d), (d,c), (a,d)\}$

(10)

$M_R =$

	a	b	c	d
a	0	1	0	1
b	0	1	0	0
c	0	0	0	1
d	0	0	1	0

(11)

$R = \{(1,1), (1,2), (1,3), (2,4), (3,1), (3,3), (4,2), (4,4)\}$

(12)

$x = 2y \quad (x, y \in Z)$

$\Rightarrow$ Relation is $(1,2), (2,4), (3,6), (4,8)$

$(5,10) \ldots$

here, $(1,2) \in R$ but $(2,1) \notin R$

$\therefore R$ is not symmetric

also $(1,1) \notin R$

$\Rightarrow$ R is not reflexive

in R, $\forall (x,y) \in R, (y,x)$ ~~does not~~

R is anti symentric

$\therefore (1,2) \in R, (2,4) \in R \not\Rightarrow (1,4) \in R$

(T3)

a) $R = \{(1,2),(2,3),(2,3),(3,9),(9,5)\}$

b) $\text{Domain}_R = \{1,2,3,9\}$

c) $\text{Range}_R = \{2,3,9,5\}$

d) R is anti symetric.