Review

(Q1) show that $p \rightarrow q$ and $\neg q \rightarrow \neg p$ are logically equivalent.

Solution:

p	q	$\neg p$	$\neg q$	$p \rightarrow q$	$\neg q \rightarrow \neg p$
T	T	F	F	T	T
T	F	F	T	F	F
F	T	T	F	T	T
F	F	T	T	T	T

Q2) Let Q(x) be the statement " $x - 1 > 2x^2$" .If the domain consists of all integers , What are the truth values?

a) Q(0) F
b) Q(1) F
c) Q(-1) F
d) $\exists_x \in Q(x)$ F
e) $\forall_x \in Q(x)$ F

Q3) Let A={1,2,3,4,5} and B={0,3,6} Find

a) $A \cup B$ ={0,1,2,3,4,5,6}

b) $A \cap B$ ={3}
c) $A - B$ ={1,2,4,5}
d) $B - A$ ={0,6}

Q4)Find the value of

a) $\left\lfloor \frac{7}{8} \right\rfloor$ =0

b) $\left\lceil \frac{3}{4} \right\rceil$ =1

Q5) Find the inverse Function of $f(x) = x^3 + 1$

Solution:

1) $y = x^3 + 1$

2) $x = y^3 + 1$

3) $x - 1 = y^3$

$\sqrt[3]{x-1} = \sqrt[3]{y^3}$

$\sqrt[3]{x-1} = y$

Steps:

1- set f(x)=y

2-Replace X with Y

3-solve for Y

4- Write $f(x)^{-1}$

$f(x)^{-1} = \sqrt[3]{x-1}$

Q6) a) let $f(x) = 3x + 4$ and $g(x) = x^2$

Find $f \circ g$

Solution:

$$f\big(g(x)\big) = f(x^2) = 3x^2 + 4$$

b)let $f(x) = 3x + 4$ and $g(x) = x^2 - 1$

Find $f \circ g$ Solution:

$$f\big(g(x)\big) = f(x^2 - 1) = 3(x^2 - 1) + 4 = 3x^2 - 3 + 4$$
$$= 3x^2 + 1$$

Q7) Calculate the number of multiples of 3 or 5 from 1 to 500?

Solution:

A: the set of numbers of multiple 3 from 1 to 500

B: the set of numbers of multiple 5 from 1 to 500

$|A \cup B| = |A| + |B| - |A \cap B|$

$=\left\lfloor \frac{500}{3} \right\rfloor + \left\lfloor \frac{500}{5} \right\rfloor - \left\lfloor \frac{500}{15} \right\rfloor = 166 + 100 - 33 = 233$

Q8)Find the formula of the following sequence, Find the initial value.

$$\frac{1}{2}, \frac{3}{4}, 1, \frac{5}{4}, \frac{3}{2}, \ldots.$$

Solution: $\{\mathrm{a} + \mathrm{nd}\}_{n=0}$

The initial value a=$\frac{1}{2}$, b=$\frac{1}{4}$

Q9)Find the value of the following summation :

a)$\sum_{j=1}^{4} j^2$ Solution:=$1^2 + 2^2 + 3^2 + 4^2 = 1 + 4 + 9 + 16 = 30$

b)$\sum_{i=1}^{10} 2$ Solution:=2+2+2+2+2+2+2+2+2+2=2(10)=20