Section-2

Q 2 Let $G(x) = \sum_{n=0}^{\infty} a_n x^n$ be the generating function of the sequence $a_0, a_1, a_2 \ldots$

we sum both side of the last equations starting with $n=1$ To Find that

$$G(x) - 1 = \sum_{n=1}^{\infty} a_n x^n = \sum_{n=1}^{\infty} (8a_{n-1} x^n + 10^{n-1} x^n)$$

$$= 8 \sum_{n=1}^{\infty} a_{n-1} x^n + \sum_{n=1}^{\infty} 10^{n-1} x^n$$

$$= 8x \sum_{n=1}^{\infty} a_{n-1} x^{n-1} + x \sum_{n=1}^{\infty} 10^{n-1} x^{n-1}$$

$$= 8x \sum_{n=0}^{\infty} a_n x^n + x \sum_{n=0}^{\infty} 10^n x^n$$

$$= 8x\, G(x) + x/(1-10x)$$

$$\therefore \quad G(x) - 1 = 8x G(x) + 1/(1-10x)$$

Expanding the right hand side of Eq into partial fractions gives

$$G(x) = \frac{1}{2}\left(\frac{1}{1-8x} + \frac{1}{1-10x}\right)$$

$$G(x) = \frac{1}{2}\left(\sum_{n=0}^{\infty} 8^n x^n + \sum_{n=0}^{\infty} 10^n x^n\right)$$

Section - 2

Q2 a)

The compound proposition will be : $(p \vee q \wedge r) = s$

Let p be the proposition It is sunny this afternoon"

q be the proposition "It is colder then yesterday r be the proposition "We will go swimming s be the proposition We will take a canoe trip" and t be the proposition.

We will be home by sunset

Then then the hypothesis becomes $\neg p \vee q$, $r - p$, $\neg r - s$, and $s \to t$ The conclusion is simply t

We construct an argument to show that our hypothesis lead to the conclusion as follows

SNo	Step	Reason
1	$\neg p \vee q$	Hypothesis
2	$\neg p$	Simplification using step 1
3	$r \to p$	Hypothesis
4	$\neg r$	Modus tollens using step 1 2 3
5	$\neg r \to s$	Hypothesis
6	s	Modus ponens using steps 4 & 5
7	$s \to t$	Hypothesis
8	t	Modus ponens using steps 6 & 7