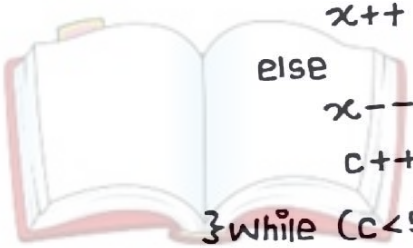
Important Miscellaneous Problems

Problem-01:-

Generate three address code for the following-

```
c = 0
do
{
    if (a<b) then
        x++ ;
    else
        x--;
        c++;
}while (c<5)
```



Solution:-

1) c = 0
2) if (a<b) goto (4)
3) goto (7)
4) T1 = x+1
5) x = T1
6) goto (9)
7) T2 = x-1
8) x = T2
9) T3 = c+1
10) c = T3
11) if (c<5) goto (2)
12)

Problem-02:-

Generate three address code for-

```
while (A<C and B>D) do
if A=1 then C=C+1
else
    while A<=D
        do A=A+B
```

Solution:-

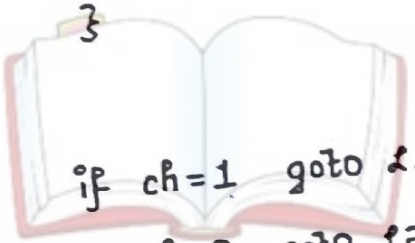
Three address code is-

```
1) if (A<C) goto (3)
2) goto (15)
3) if (B>D) goto (5)
4) goto (15)
5) if (A=1) goto (7)
6) goto (10)
7) T1 = C+1
8) C = T1
9) goto (1)
10) if (A<=D) goto (12)
11) goto (1)
12) T2 = A+B
13) A = T2
14) goto (10)
15)
```

Problem-03:- Generate three address code for-

```
switch (ch)
{
    case 1 : c = a+b ; break;
    case 2 : c = a-b ; break ;
}
```

Solution:-




```
if ch = 1  goto L1
if ch = 2  goto L2

L1 :  T1 = a+b
      c = T1
      goto last

L2 :  T2 = a-b
      c = T2
      goto last

last :
```

Problem :-4

Construct a DAG for the following three address code -

$$a = b + c$$

$$t1 = a * a$$

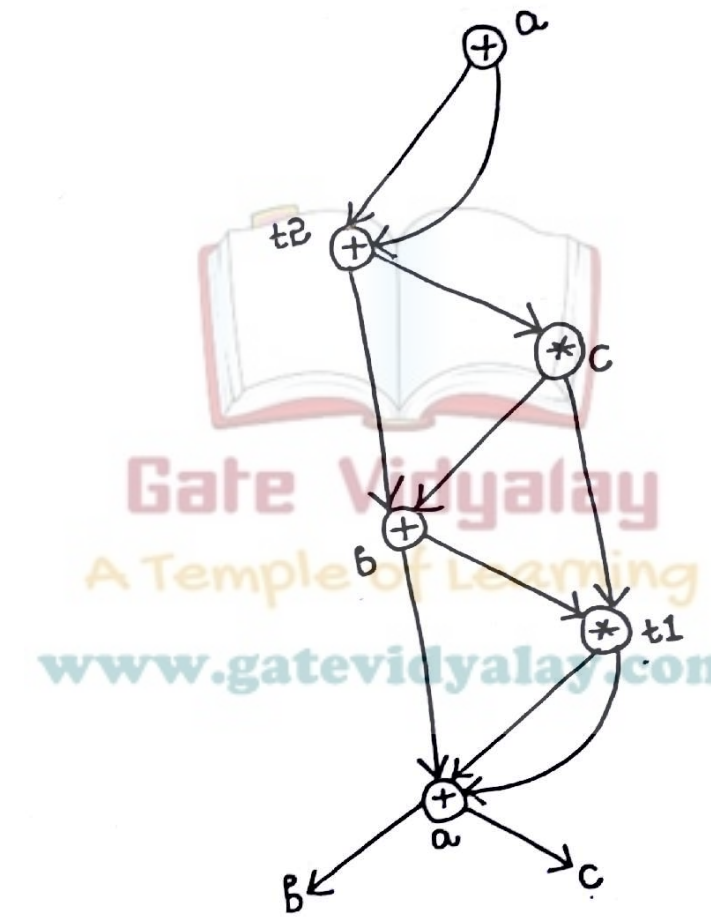
$$b = t1 + a$$

$$c = t1 * b$$

$$t2 = c + b$$

$$a = t2 + t2$$

Solution:- Constructing a DAG:-



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Problem-5 :-

Consider the following code -

```
prod = 0;
i = 1;
do
{
    prod = prod + a[i] * B[i];
    i = i+1;
}while (i<=10);
```


A) Compute the three address code.

B) Compute the basic blocks and draw the flow graph.

Solution :-

A) Generation of 3 address code :-

1) prod = 0
2) i = 1
3) T1 = 4 * i
4) T2 = a[T1]
5) T3 = 4 * i
6) T4 = b[T3]
7) T5 = T2 * T4
8) T6 = T5 + prod
9) prod = T6
10) T7 = i + 1
11) i = T7
12) if (i <= 10) goto (3)

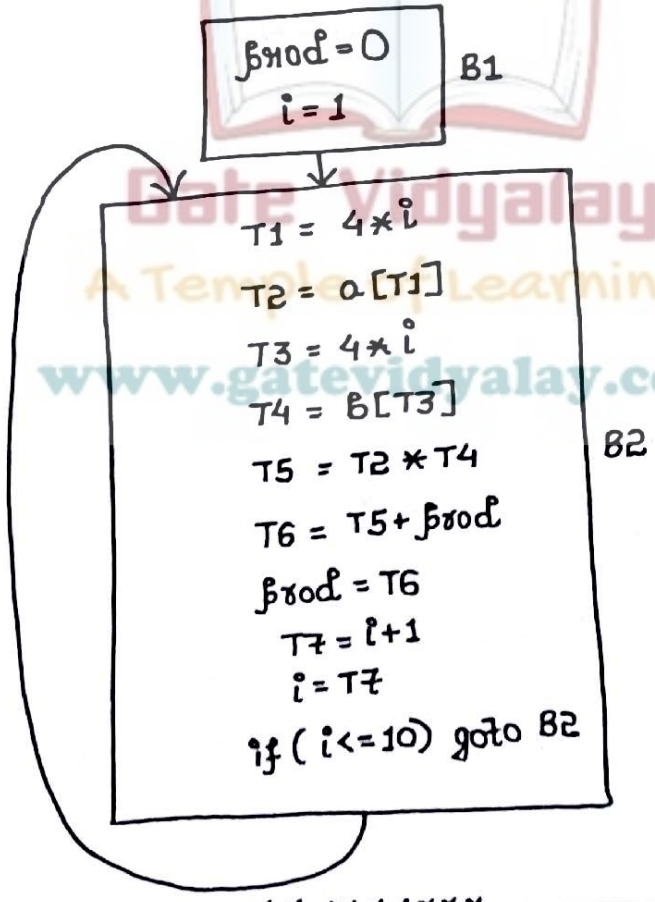
B) Because first statement is a leader. So,

prod = 0 is a leader.

Also, Because target statement of a conditional or unconditional goto is a leader. So,

T1 = 4*i is also a leader.

Thus, the above generated three address code can be partitioned into 2 blocks as -



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