

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)

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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) $A = T2$

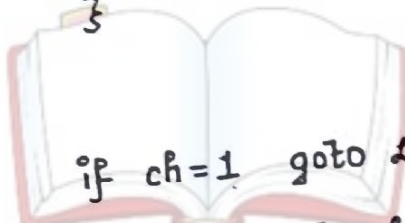
14) goto (10)

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
```

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

```
last:
```

Problem:-4

Construct a DAG for the following three address code -

$$a = b + c$$

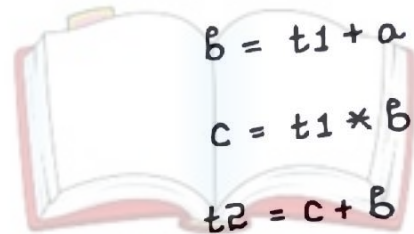
$$t1 = a * a$$

$$b = t1 + a$$

$$c = t1 * b$$

$$t2 = c + b$$

$$a = t2 + t2$$



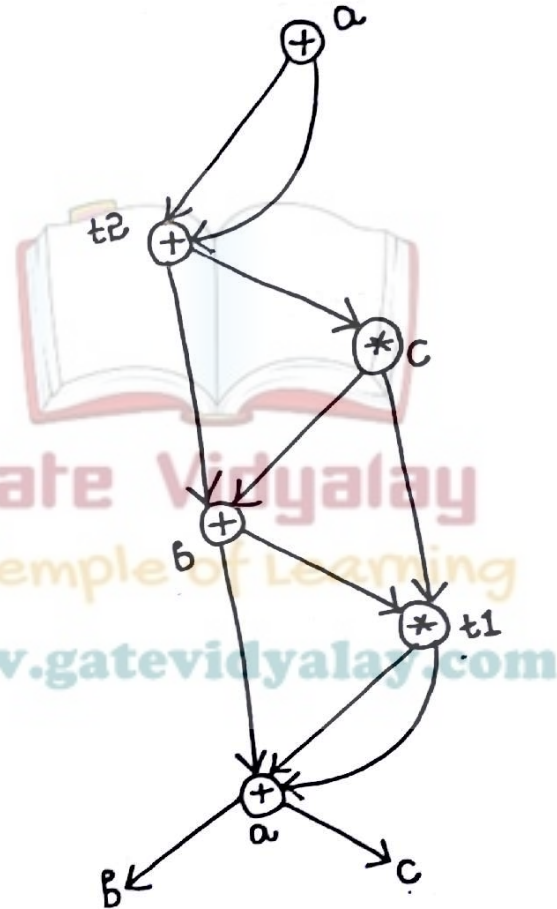
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Solution:-

Constructing a DAG:-



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Problem-5 :-

Consider the following code -

```
sum = 0 ;  
i = 1 ;  
do  
{  
    sum = sum + 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) $\beta_{\text{mod}} = 0$

2) $i = 1$

3) $T_1 = 4 * i$

4) $T_2 = a[T_1]$

5) $T_3 = 4 * i$

6) $T_4 = b[T_3]$

7) $T_5 = T_2 * T_4$

8) $T_6 = T_5 + \beta_{\text{mod}}$

9) $\beta_{\text{mod}} = T_6$

10) $T_7 = i + 1$

11) $i = T_7$

12) if ($i \leq 10$) goto (3)

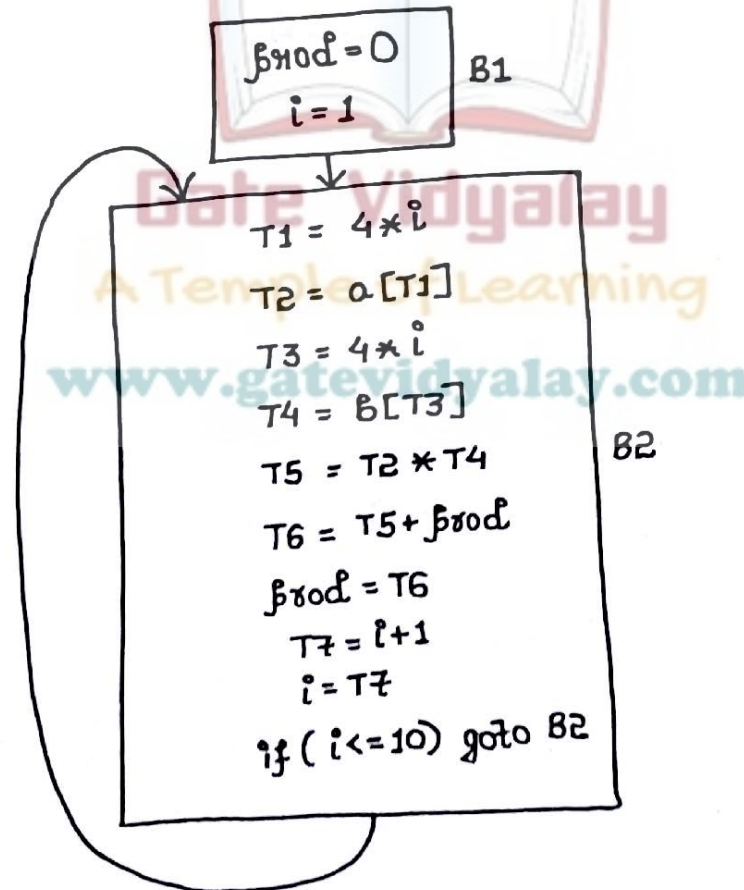
B) Because first statement is a leader. So,

$\beta \text{prod} = 0$ 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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