Date / /
Page

Sahil Jindal 18CS10048

Assignment-6

Ans (a) `if (a==b && c==d || e==f) x=1;`

⇓

```
if a==b goto L1;
   goto L2;
L1 : if c==d goto L4;
L2 : if e==f goto L3;
     goto L4;
L3 = x=1;
L4 =
```

(b) `if (a==b || c==d || e==f) x=1;`

```
if a==b goto L1;
if c==d goto L1;
if e==f goto L4;
   goto L2;
L1 : x=1;
L2 :
```

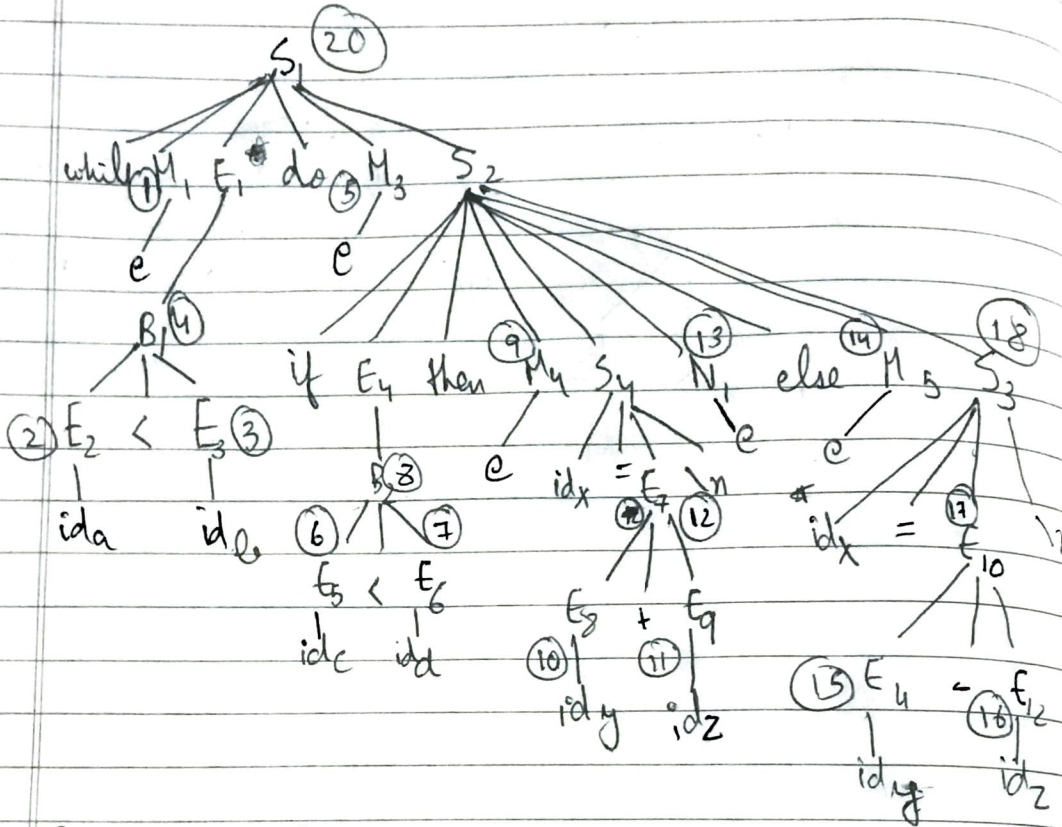
(c) `if (a==b && b c==d && (e==f) x=1;`

```
if a==b goto L1;
   goto L4;
L4 : if c==d goto L2;
     goto L4;
L2 : if e==f goto L3;
     goto L4;
L3 : x=1;
L4 :
```

Date / /

Page

A2 Parse Tree:



→ Reduction rules: -

1. $H_1 \rightarrow e$: $M_1.I = 100$
2. $E_2 \rightarrow id_a$: $E_2.loc = a$
3. $E_3 \rightarrow id_b$: $E_3.loc = b$
4. $B_1 \rightarrow E_2 < E_3$: $B_1.TL = \{100\}$
   $B_1.FL = \{101\}$
   emit(if a < b goto...)
   emit(goto...)
5. $M_3 \rightarrow e$: $M_3.I = 102$
6. $E_5 \rightarrow id_c$: $E_5.loc = c$
7. $E_6 \rightarrow id_d$: $E_6.loc = d$
8. $B_2 \rightarrow E_5 < E_6$: $B_2.TL = \{102\}$
   $B_2.FL = \{103\}$
   Emit(if c < d goto...)
   emit(goto...)

9. $M_4 \rightarrow e$: $M_4.I = 104$

10. $E_8 \rightarrow id_y$: $E_8.loc = y$

11. $E_9 \rightarrow id_z$ = $E_9.loc = z$.

12. $E_7 \rightarrow E_8 + E_9$: $E_7.loc = t_1$
emit ($t_1 = y + z$)

13. $S_4 \rightarrow id_x = E_7 \backslash n$: $S_4.NL = null$;
emit ($x = t_1$)

14. $N_1 \rightarrow e$: $N_1.NL = \{106\}$
emit (goto ...)

15. $M_5 \rightarrow e$: $M_5.I = 107$

16. $E_{11} \rightarrow id_y$: $E_{11}.loc = y$

17. $E_{12} \rightarrow id_z$: $E_{12}.loc = z$

18. $E_{10} \rightarrow E_{11} - E_{12}$: $E_{10}.loc = t_2$
emit ($t_2 = y - z$)

19. $S_3 \rightarrow id_x = E_{10} \backslash n$: $S_3.NL = \{null\}$
emit ($x = t_2$)

20. $S_2 \rightarrow$ if E_4 then $M_4 S_4 N_1$ else $M_5 S_3$: backpatch($B_2.TL$, 104)
backpatch($B_2.FL$, 107)
$S_2.NL = \{106\}$.

21. $S_1 \rightarrow$ while $M_1 E_1$ do $M_3 S_2$: backpatch($S_2.NL$, 100)
backpatch($B_1.TL$, 102)
$S.NL = \{101\}$
emit (goto 100)

Final translated TAC:

```
100: if a < b goto 102
101: goto ___
102: if c < d goto 104
103: goto 107
104:   t1 = y + z
105:   x = t1
106:   goto 100
107:   t2 = y - z
108:   x = t2
109:   go to 100.
```