1.

if (T3 > 0)

halt

H = I

M = T3 – H

A = A + 1

T2=T1/C

if (T2 < W)

T1=A\*B

T3 = A + 1

I = A \* B

(a)

(b):

Compute the def, Nkill and avail set for each block:

Avail = {}

Def = {e1: A\*B}, NKilled={e1, e3, e4, e5, e6, e7}

T1=A\*B

Avail = {}

T2=T1/C

Def = {e2: T1/C}, NKilled={e1 - e7}

H = I

M = T3 – H

A = A + 1

T3 = A + 1

I = A \* B

Avail = {e2}

Def = {e3: A+1, e4: A\*B}, NKilled = {e1, e2, e3, e4, e7}

Avail = {e2}

Def = {e5: I, e6: T3 - H, e7: A + 1}, NKilled = {e3, e5}

halt

After calculating the avail set for each basic block, we generate the global names e2 for expression T1/C and replace that expression with e2.

2.

(a):

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0 (enter) | 1 | 2 | 3 | 4 | 5 | 6 | 7 (exit) |
| Dom | 0 | 0, 1 | 0, 1, 2 | 0, 1, 2, 3 | 0, 1, 2, 4 | 0, 1, 2, 4, 5 | 0, 1, 2, 4, 6 | 0, 1, 2, 4, 7 |
| sDom |  | 0 | 0, 1 | 0, 1, 2 | 0, 1, 2 | 0, 1, 2, 4 | 0, 1, 2, 4 | 0, 1,2, 4 |
| iDom | 0 | 0 | 1 | 2 | 2.,, | 4 | 4 | 4 |

(b):

DF(B2) = {B2}, since B2 strictly dominates every one of its children nodes

DF(B3) = {B2}, since B3 dominates B2, which is a predecessor of B3, and doesn’t strictly dominates B3.

DF(B6) = {exit}, since B6 dominates B6, which is a predecessor of exit, and doesn’t stricly dominates exit