Tutorial-6 M. Sai Jishnu AM.EM.U4CIE17309

①

```
i = m-1
j = n
t1 = 4*n
p = a[t1]
```

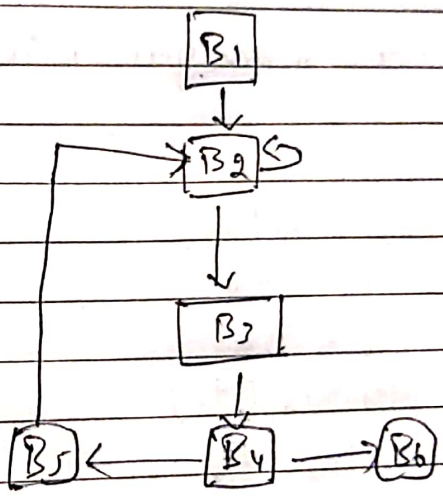
```
i = i+1
t2 = 4*i
t3 = a[t2]
if t3<p goto B2
```

```
j = j-1
t4 = 4*j
t5 = a[t4]
if t5>p goto B3
```

```
if i≥j goto B6
```

```
t6 = 4*i
t = a[t6]
t7 = 4*i
t8 = 4*j
t9 = a[t8]
a[t7] = t9
t10 = 4*j
a[t10] = t
goto B2
```

```
t11 = 4*i
t = a[t11]
t12 = 4*i
t13 = 4*n
t14 = a[t13]
a[t12] = t14
t15 = 4*n
a[t15] = t
```



Replacing gotos with block nos.

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Q: Pg2

Local common subexpression elimination,

B5 B6

B5

```
t6 = 4*i
t = a[t6]
t7 = t6
t8 = 4*j
t9 = a[t8]
a[t7] = t9
t10 = t8
a[t10] = t
goto B2
```

B6

```
t11 = 4*i
t = a[t11]
t12 = t11
t13 = 4*n
t14 = a[t13]
a[t12] = t14
t15 = t13
a[t15] = t
```

Copy Propogation for t7, t10, t12, t15

```
t6 = 4*i
t = a[t6]
t7 = t6
t8 = 4*j
t9 = a[t8]
a[t6] = t9
t10 = t8
a[t8] = t
goto B2
```

```
t11 = 4*i
t = a[t11]
t12 = t11
t13 = 4*n
t14 = a[t13]
a[t11] = t14
t15 = t13
a[t13] = t
```

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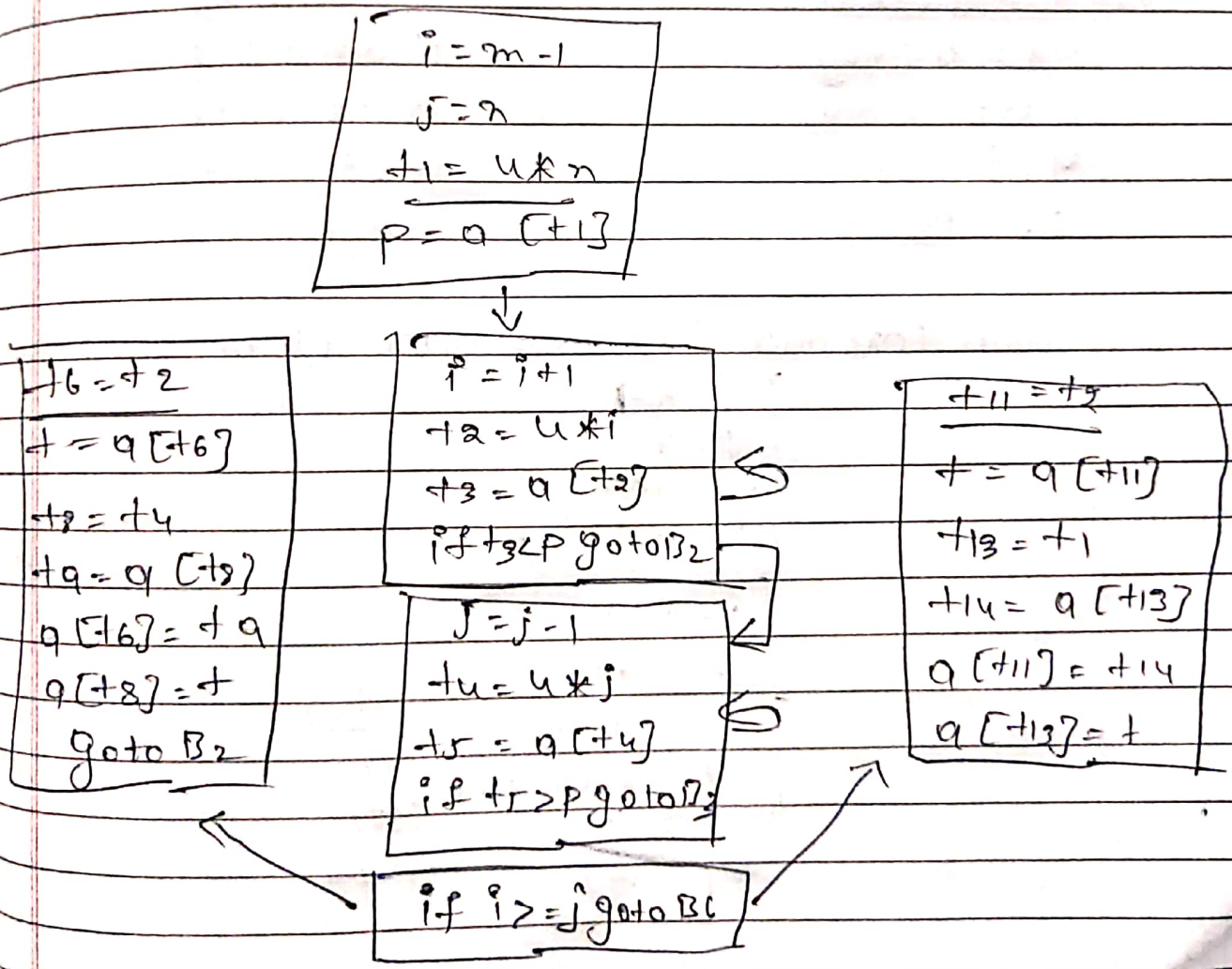
Dead code elimination for t7 t10 t12 t13

```
t6 = 4*i
t8 = a[t6]
t8 = 4*j
t9 = a[t8]
a[t6] = t9
a[t8] = t8
goto B2

t11 = 4*i
t12 = a[t11]
t14 = a[t13]
a[t11] = t14
a[t13] = t12
```

Global common subexpression elimination



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Copy Propogation on t6 t8 t11 t13

t6 = t2
t = a[t2]
t13 = t4
t9 = a[t4]
a[t2] = t9
a[t4] = t
goto B2

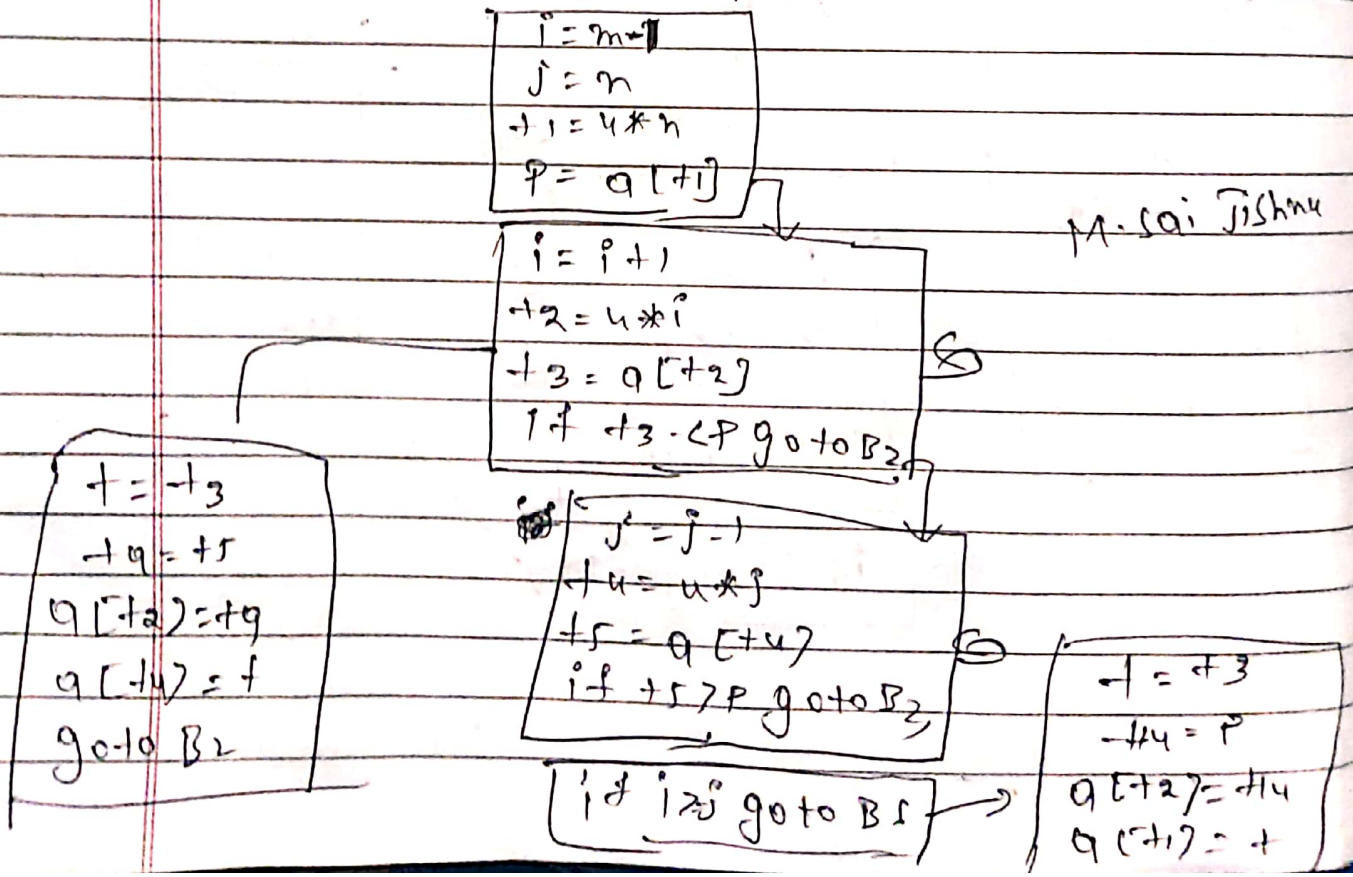
t1 = t2
t = a[t1]
t13 = t1
t14 = a[t1]
a[t2] = t14
a[t1] = t

Dead code elimination on t6 t8 t11 t13

B5
t = a[t2]
t9 = a[t4]
a[t2] = t9
a[t4] = t
goto B2

B6
t = a[t2]
t14 = a[t3]
a[t2] = t14
a[t1] = t

Global common sub expression elim



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Copy Propagation on t1, t9, t14

B5

t1 = t3
t9 = t5
a[t2] = t5
a[t4] = t3
goto B2

B6

t1 = t3
t14 = p
a[t2] = p
a[t4] = t3.

Dead code elimination on t1, t9, t14

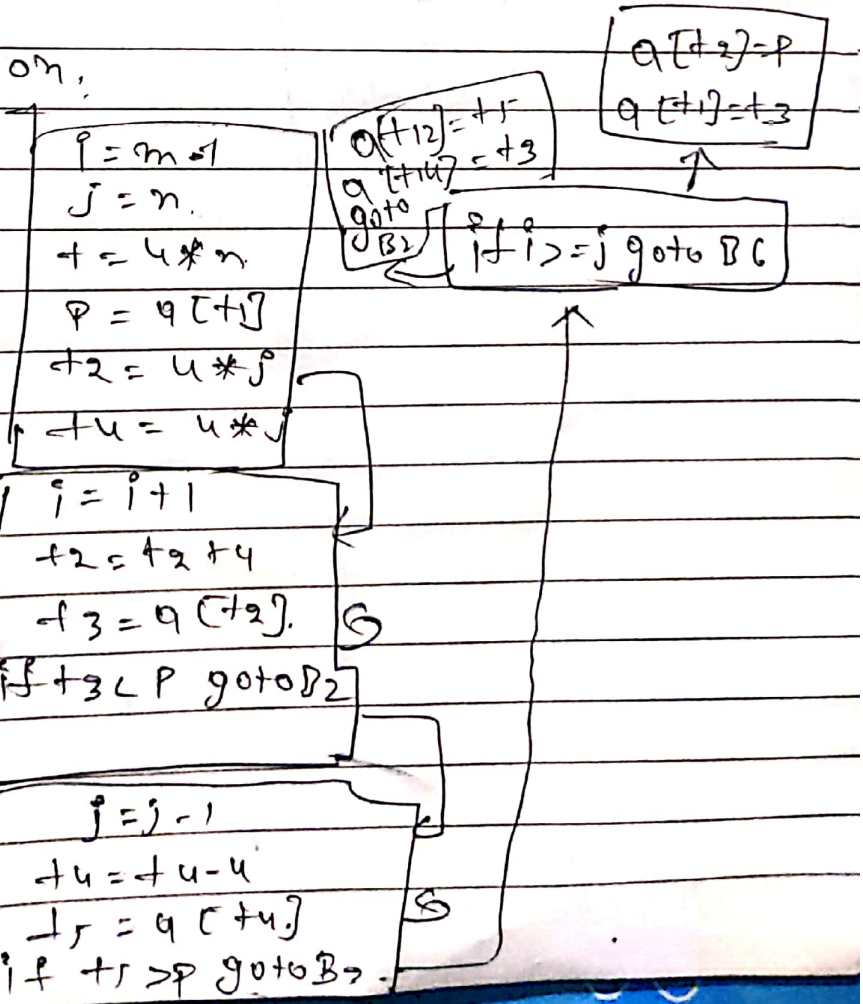
B5

a[t2] = t5
a[t14] = t3
goto B2

B6

a[t2] = p
a[t4] = t3

Strength Reduction.



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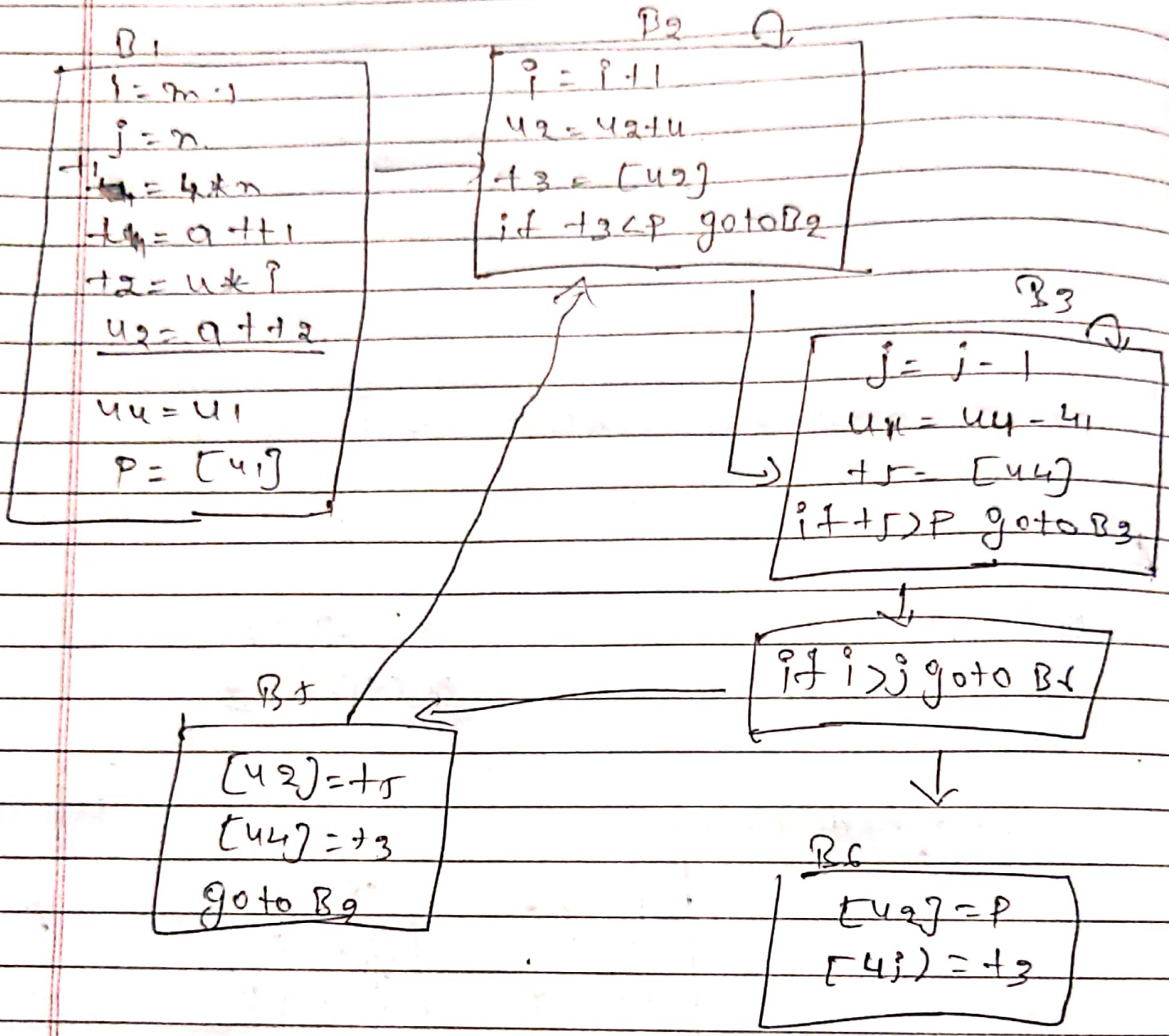
Induction variables



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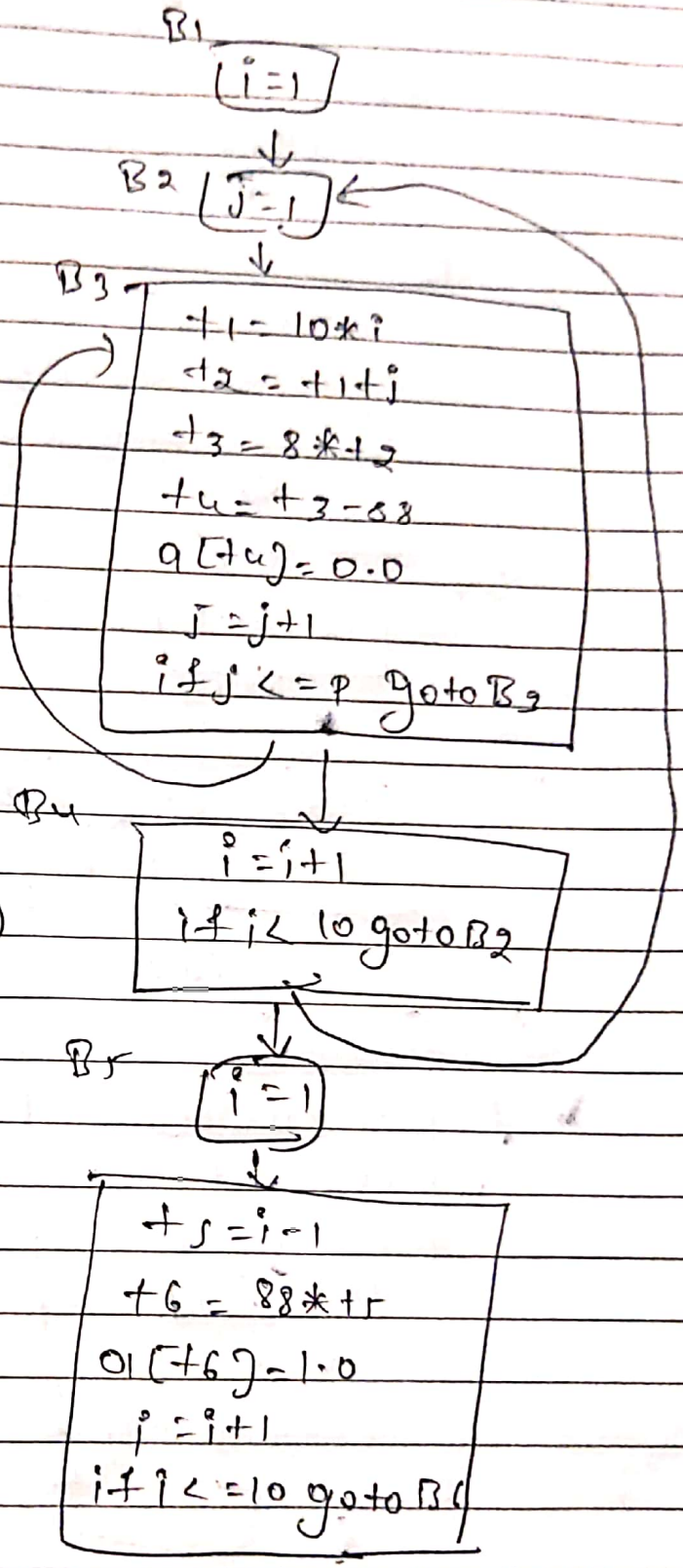
Question -2

(2) Code:

```
1)  i = 1
2)  j = 1
3)  t1 = 10 * i
4)  t2 = t1 + j
5)  t3 = 8 * t2
6)  t4 = t3 - 8
7)  j = j + 1
8)  if j <= 10 goto (3)
9)  i = i + 1
10) if i <= 10 goto (2)
11) i = 1
12) t5 = i - 1
13) t6 = 88 * t5
14) a[t6] = 1.0
15) i = i + 1
16) if i <= 10 goto (13)
```



For this Problem
No GCSE
No Copy propogation
No loop invariants.
induction variable.

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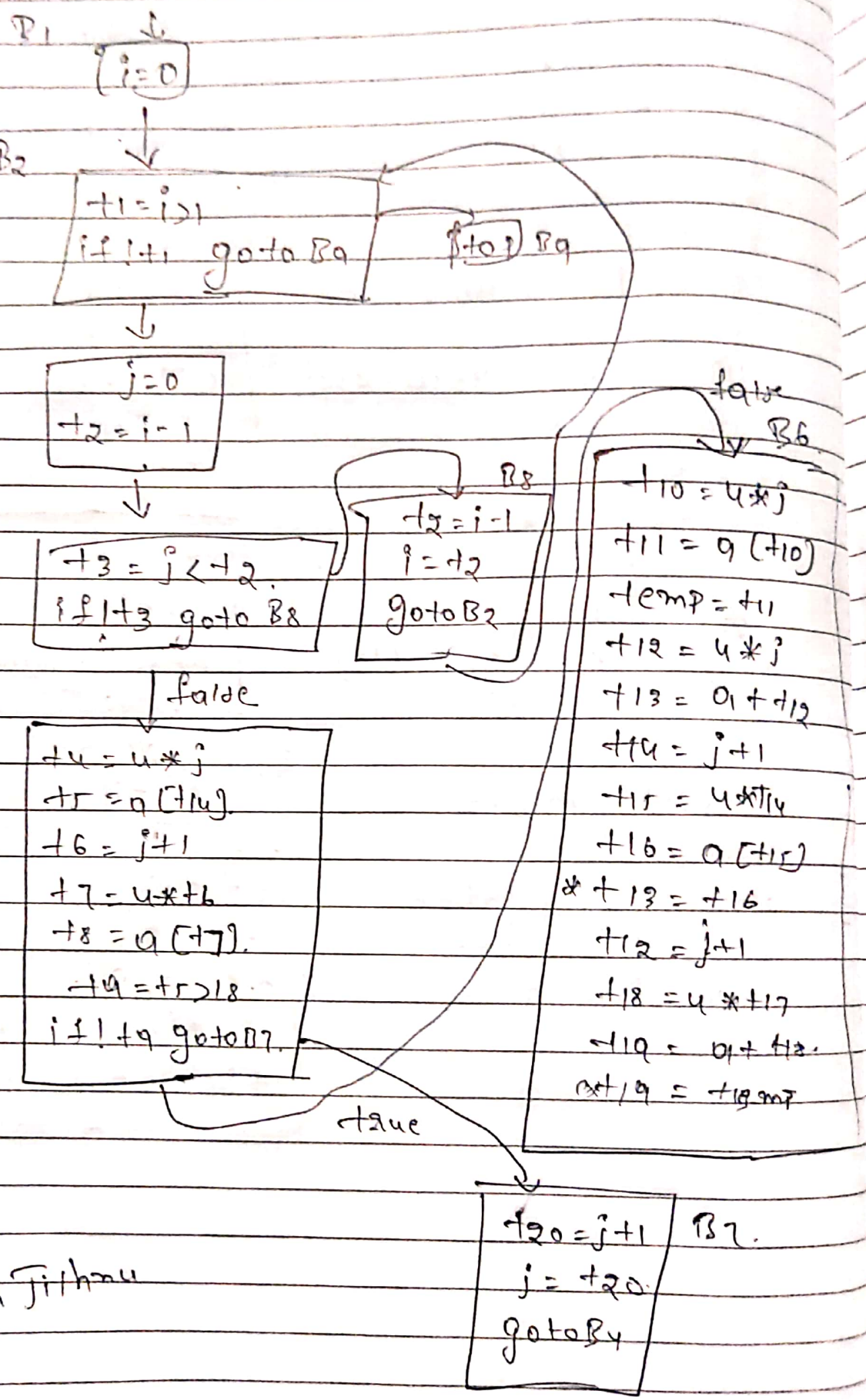
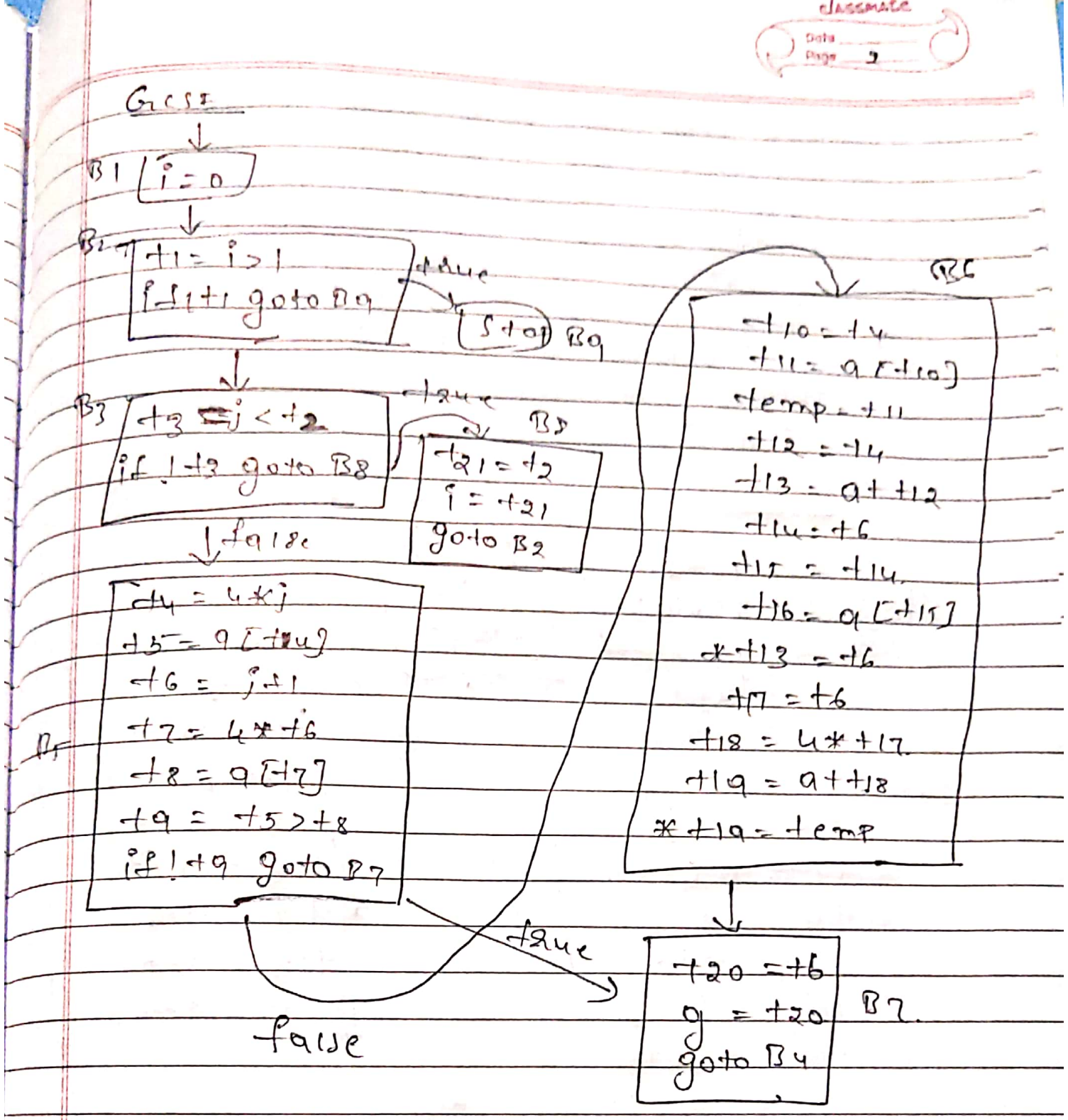
Question 3

(a) Code 3



T. Sai Jithin



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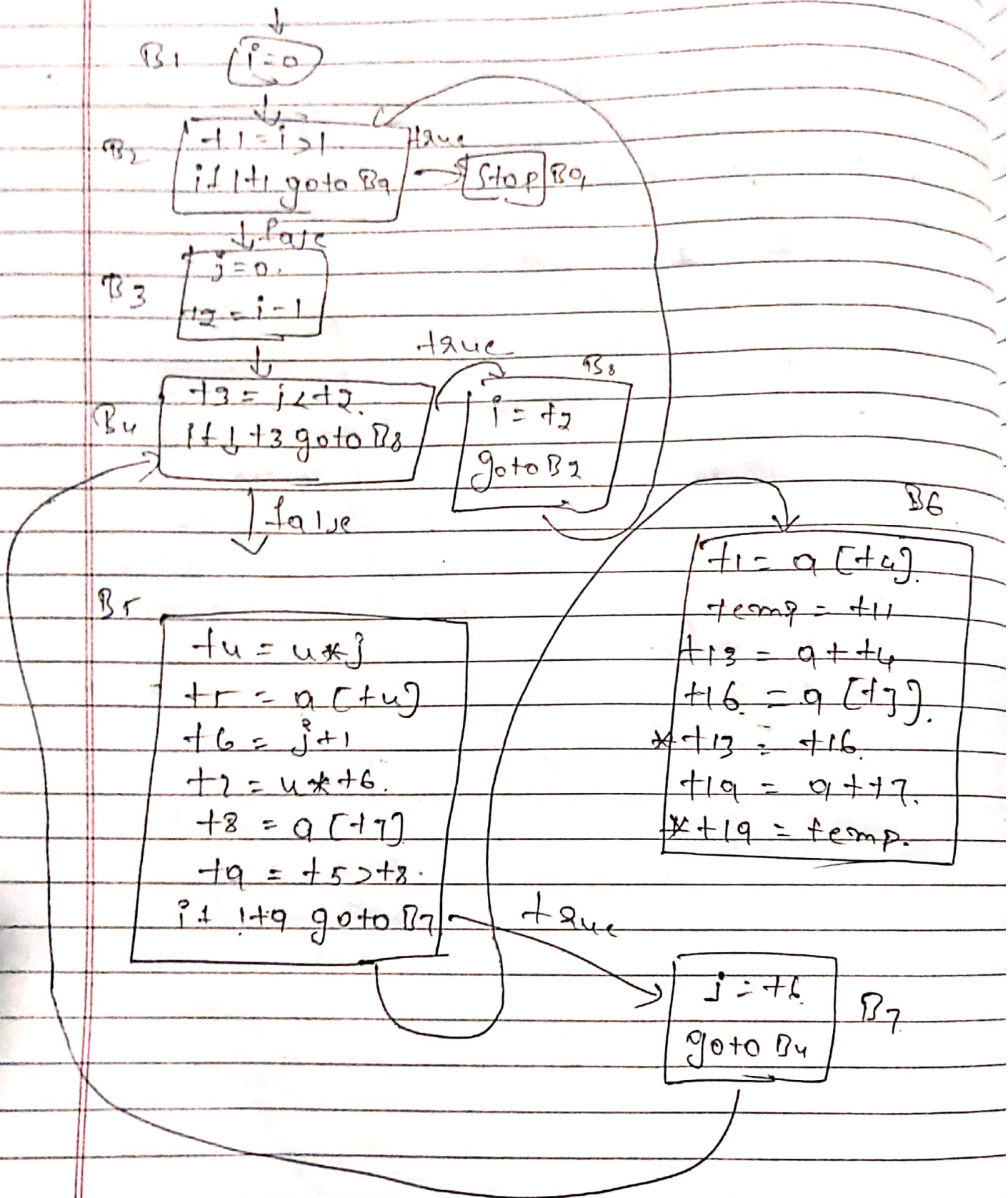
Gcse and copy Propagation



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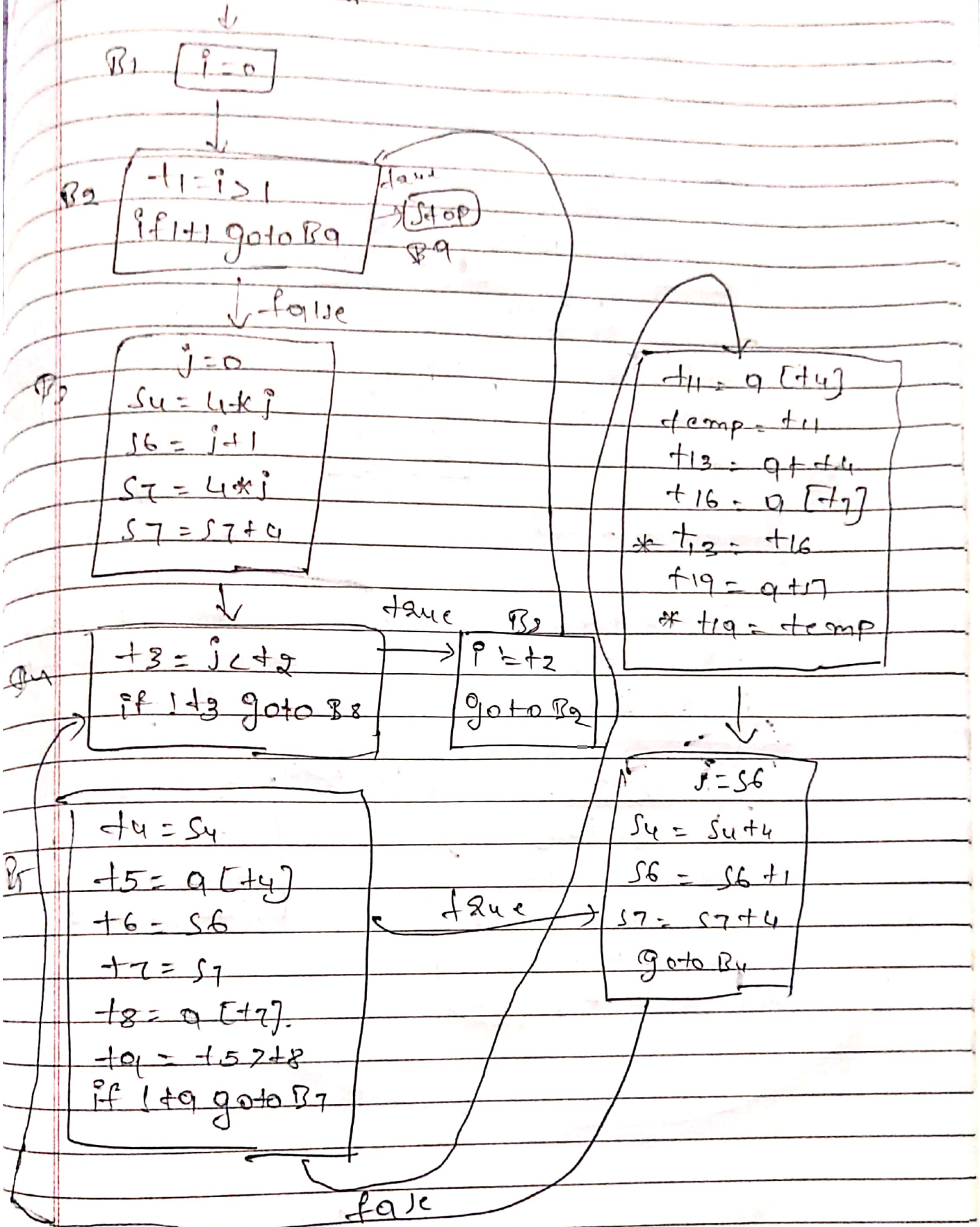
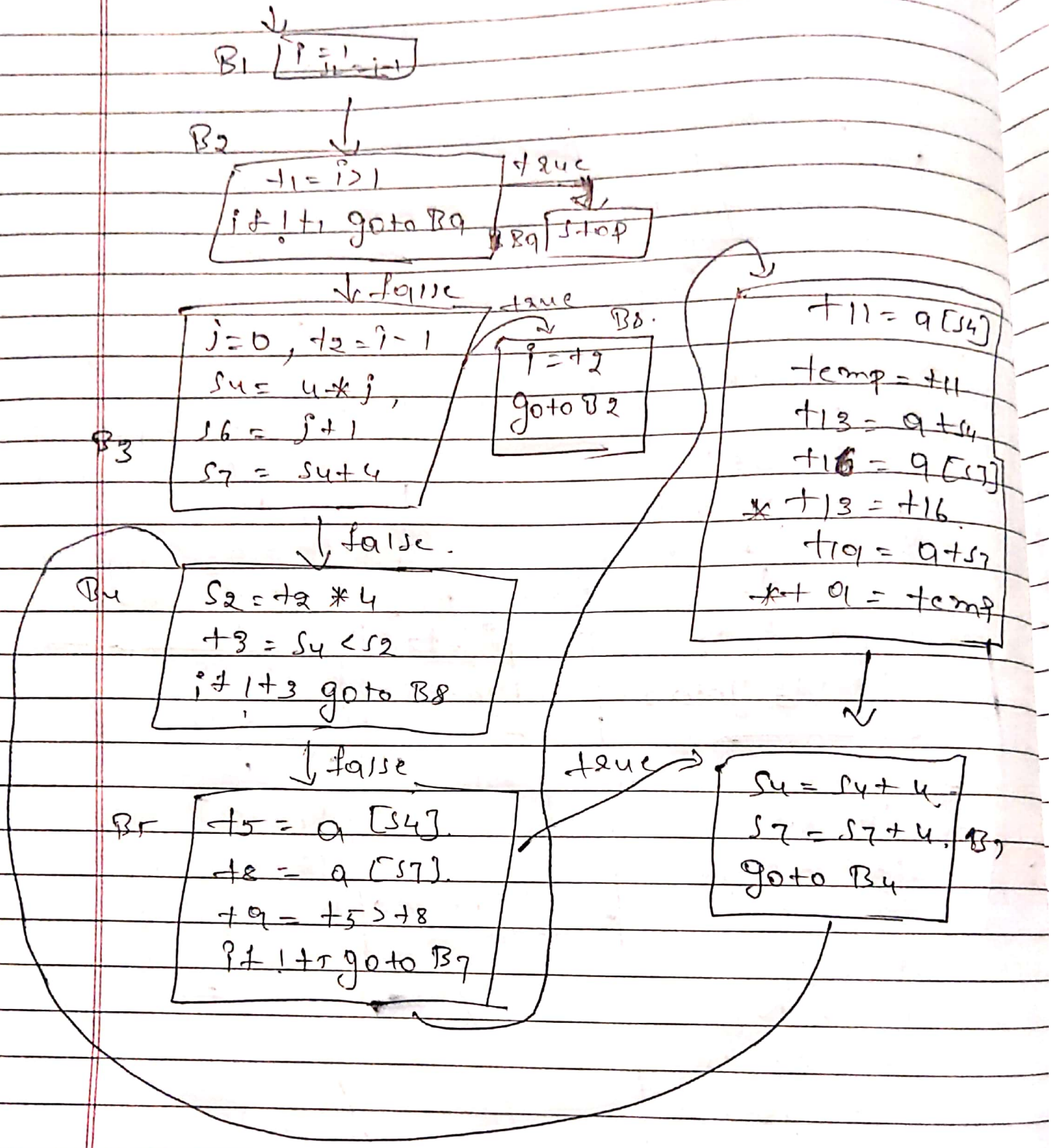
IV detection



Final



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