

Code motion

```
0: min = 10  
1: max = 100  
2: i = max  
3: i = i - 1  
4: t = min - 1  
5: if (t < i) goto 3
```

Which is loop invariant?

Code motion

```
0: min = 10
1: max = 100
2: t = 0
3: i = max
4: i = i - 1
5: t = min - 1
6: if (t < i) goto 4
```

Can loop invariant be hoisted?

Code motion

| | |
|-----------------------|-----|
| 0: min = 10 | Yes |
| 1: max = 100 | |
| 2: t = 0 | |
| 3: i = max | |
| 5: t = min - 1 | |
| 4: i = i - 1 | |
| 6: if (t < i) goto 4 | |

Code motion

```
0: min = 10
1: max = 100
2: t = 0
3: i = max
4: i = i - 1
A: write(t)
5: t = min - 1
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Why not?

Code motion

Why not?

0: min = 10

1: max = 100

2: **t** = 0

3: i = max

4: i = i - 1

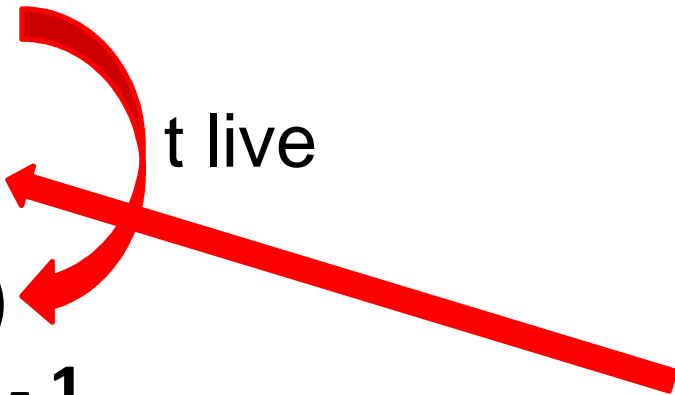
A: write(**t**)

5: t = min - 1

6: if (t < i) goto 4

t live

loop entry



Code motion

```
0: min = 10
1: max = 100
2: t = 0
3: i = max
4: i = i - 1
B: t = 1
5: t = min - 1
A: write(t)
6: if (t < i) goto 4
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Why not?

Code motion

Why not?

0: min = 10

1: max = 100

2: t = 0

3: i = max

4: i = i - 1

B: **t** = 1

5: **t** = min - 1

A: write(t)

6: if (t < i) goto 4

2 definitions of t in loop



Code motion

```
0: min = 10
1: max = 100
2: i = max
3: if (i <= 0) goto 6
4: i = i - 1
5: t = min - 1
6: goto 3
7: write(t)
```

Can loop invariant be hoisted?

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3: if (i <= 0) goto 6
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6: goto 3
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```

Why not?

Definition (5) doesn't
dominate loop exit (3)

