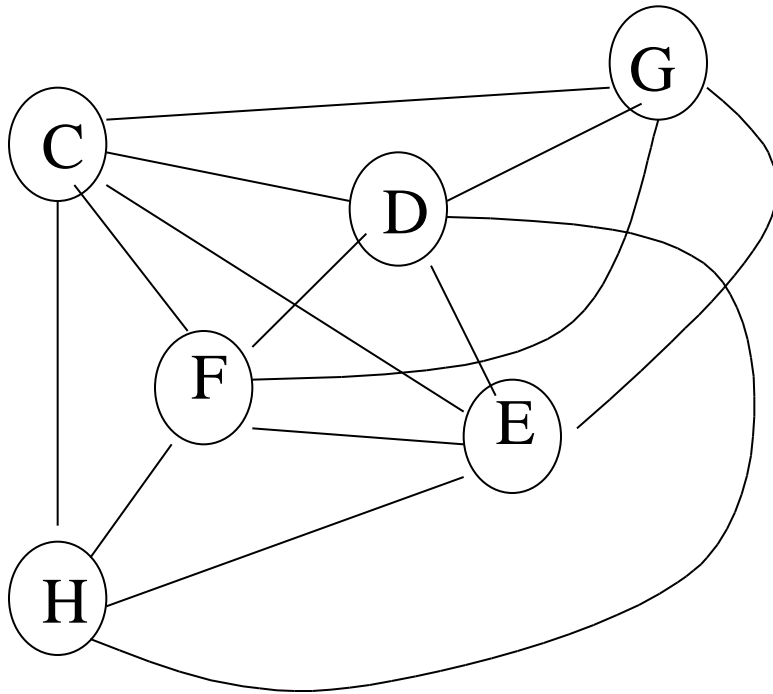


# Study HW Answers for 415 Final

- q1: register allocation from Appel, p266 nodes C-H
- q2: Reach solution at bblock entry on cfg 1
- q2: Live solution at bblock exit on cfg 2
- q3: Reach and live solutions on cfgs 1,2 ( same as cfg 3)

# Register Allocation Question



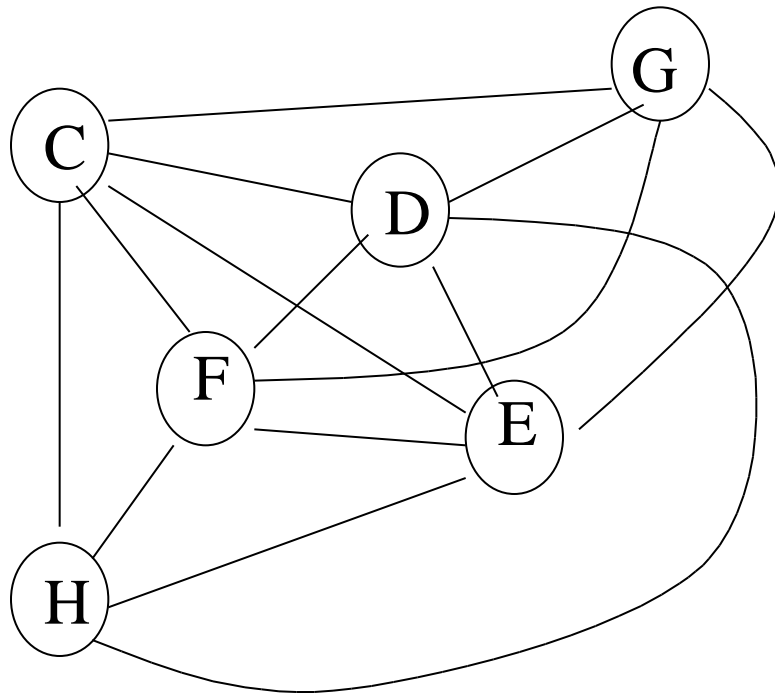
**Note:** as stack nodes, remove them and their incident edges from the graph.

**Given this interference graph from Appel text, try to color with 6 and then 4 colors.**

**For 6 colors, start by simplify and find no potential spills, because all nodes  $\leq$  degree 5.**

<u>Stack</u>	<u>Color</u>
C	H 1
G	E 2
D	F 3
F	D 4
E	G 1
H	C 5

# Register Allocation Question

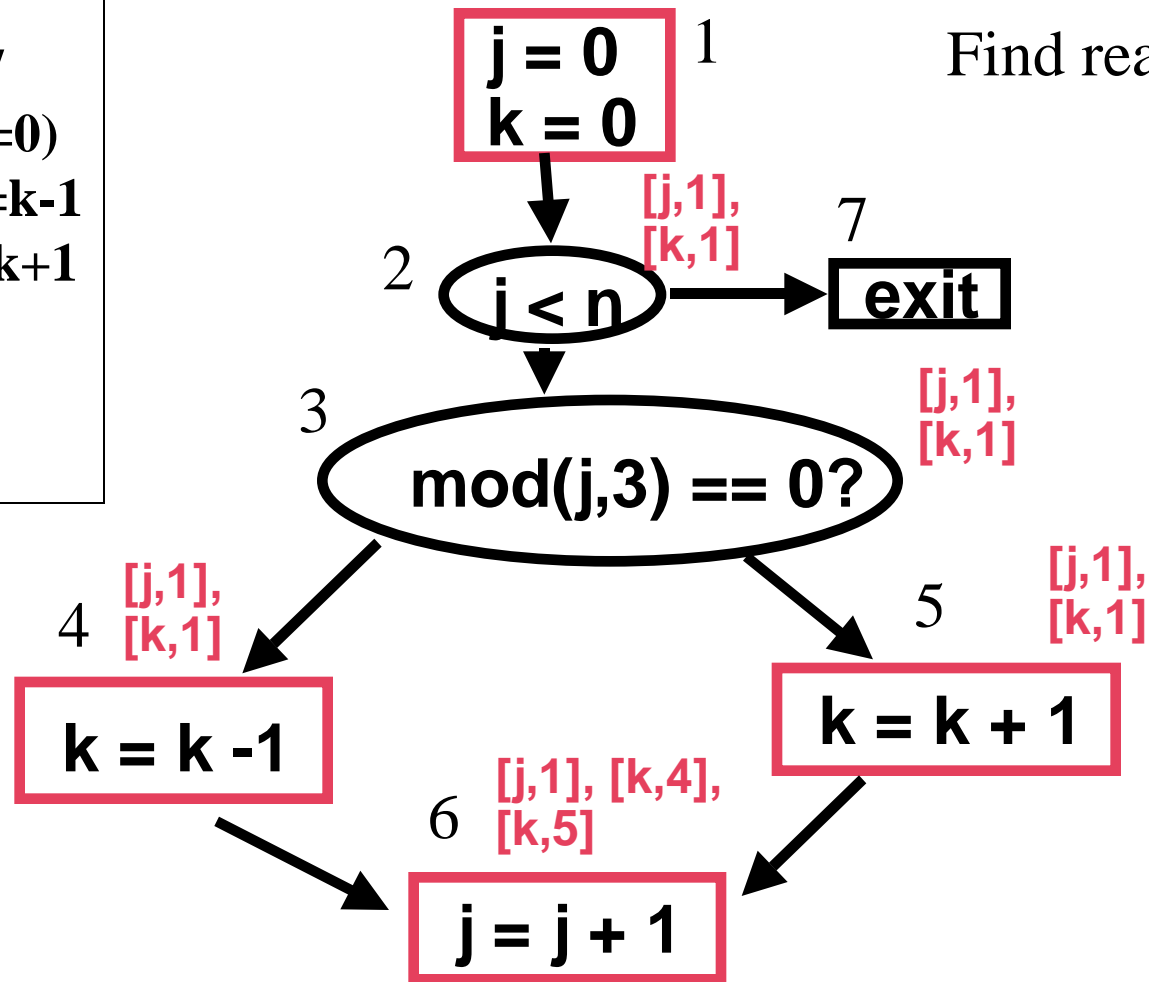


For 4 colors, start by simplify for nodes with  $< 4$  neighbors. Since there are none, have to select potential spills (PS). **If realized that graph contained 5-clique {CDEFG} would know it isn't 4 colorable.**

<u>Stack</u>	<u>Color</u>
H(PS)	G 1
F(PS)	D 2
E	C 3
C	E 4
D	F ?? have actual spill
G	

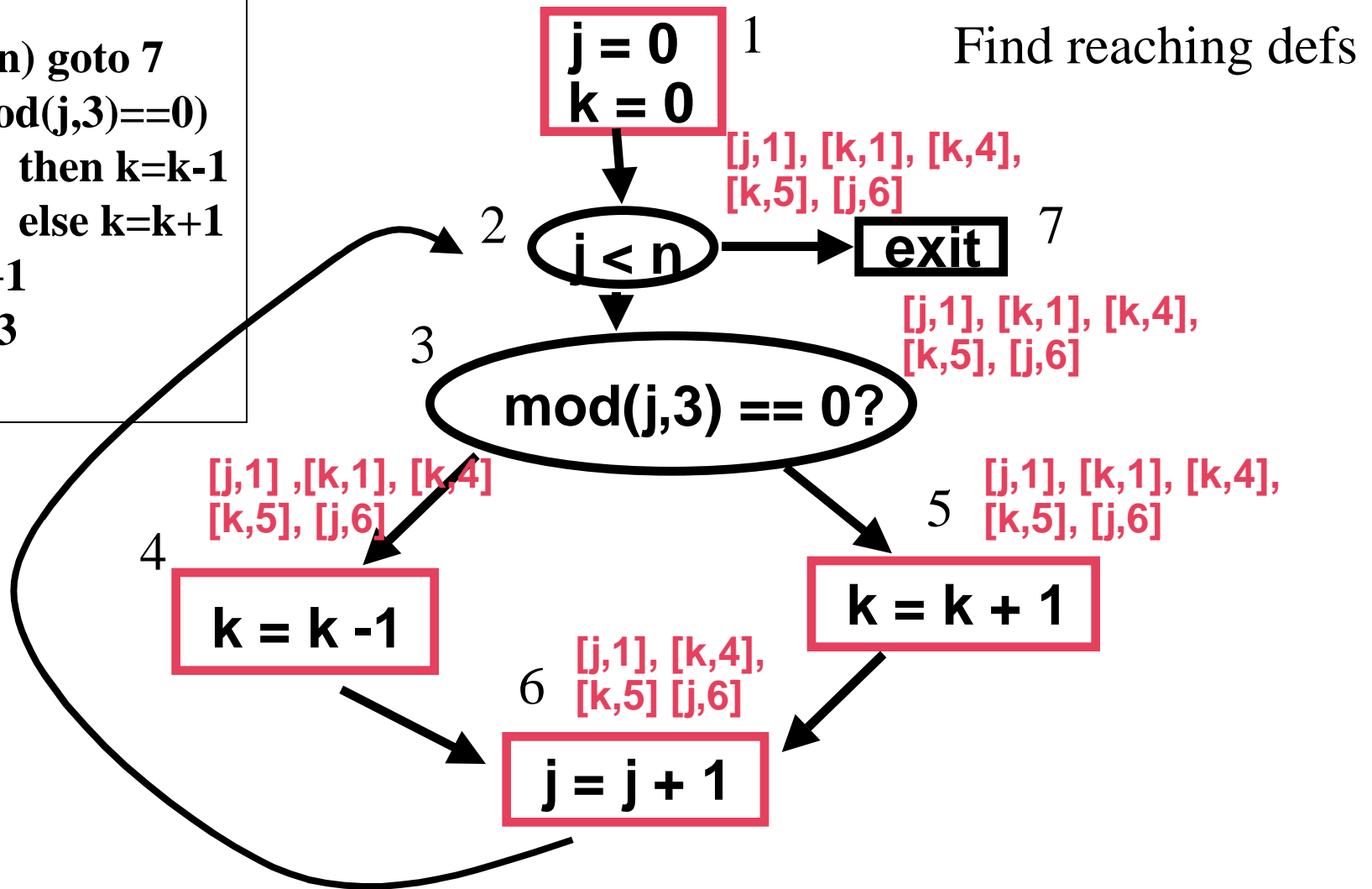
# Control Flow Graph 1

1.  $j = 0$
2.  $k = 0$
3. if ( $j < n$ ) goto 7
4. if ( $\text{mod}(j,3) == 0$ )  
then  $k = k - 1$   
else  $k = k + 1$
5.  $j = j + 1$
6. goto 3
- 7.



# Control Flow Graph 1

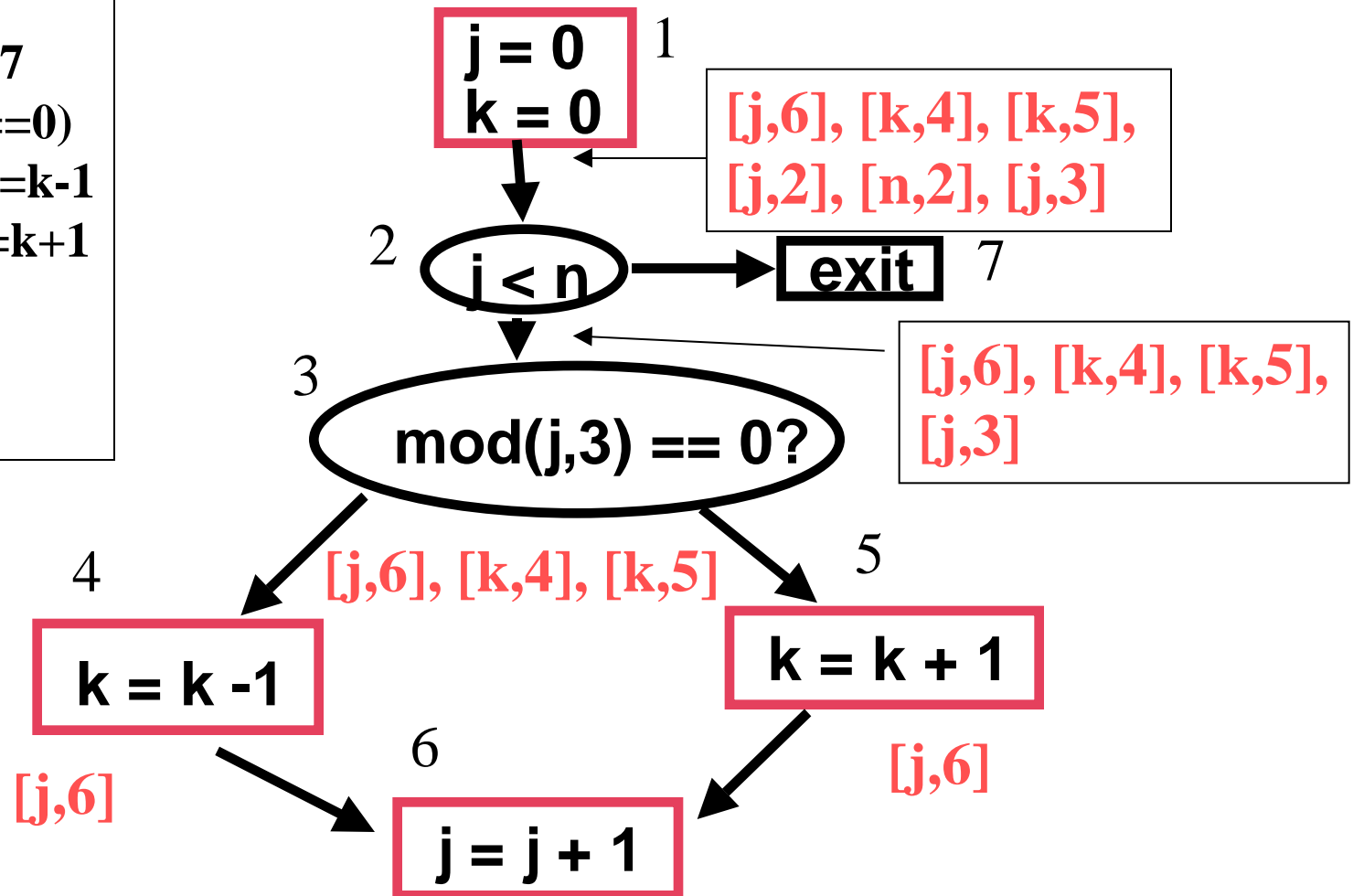
```
1. j = 0
2. k = 0
3. if (j < n) goto 7
4. if (mod(j,3) == 0)
   then k = k - 1
   else k = k + 1
5. j = j + 1
6. goto 3
7.
```



# Control Flow Graph 2

Find live uses of variables

1.  $j = 0$
2.  $k = 0$
3. if ( $j < n$ ) goto 7
4. if ( $\text{mod}(j,3) == 0$ )  
then  $k = k - 1$   
else  $k = k + 1$
5.  $j = j + 1$
6. goto 3
- 7.



# Control Flow Graph 2

Find live uses of variables.

