a, b live

		a	b
$x = a + r$	x		↓
$y = 2 + x$	y	z	
$z = x + 1$			
$u = b + z$		u ↓	↓
$v = u + 3$			
$w = u + 5$	↓ w	x	
$x = w + 2$			
$r = w + y$	↓	↓	r

liveness intervals

(dead code)

r, x live

interference graph

Algorithm to color with $k = 3$ colors

(SIMPLIFY)

① remove each node with $< k$ neighbours and push on a stack
if we color the remaining graph then we can color that node
For us, a, u, r have < 3 neighbours
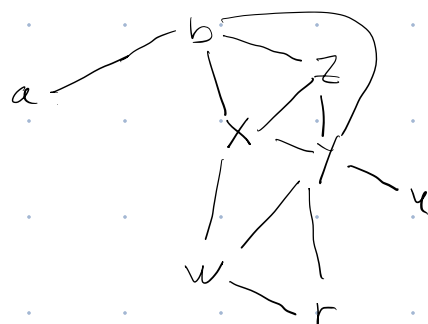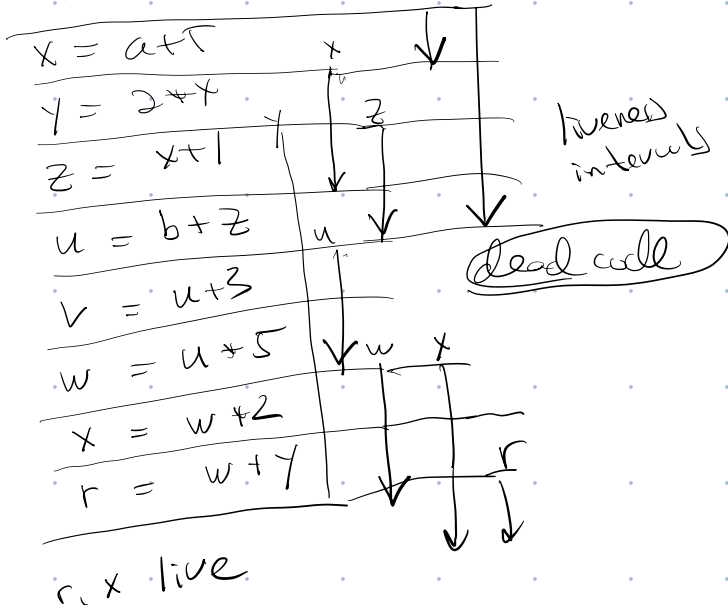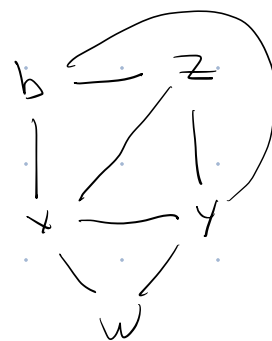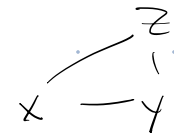
Assume we have 3 registers. Can we "color" the nodes of the graph with 3 colors R1, R2, R3
So no edge connects nodes of the same color?

Stack a, u, r

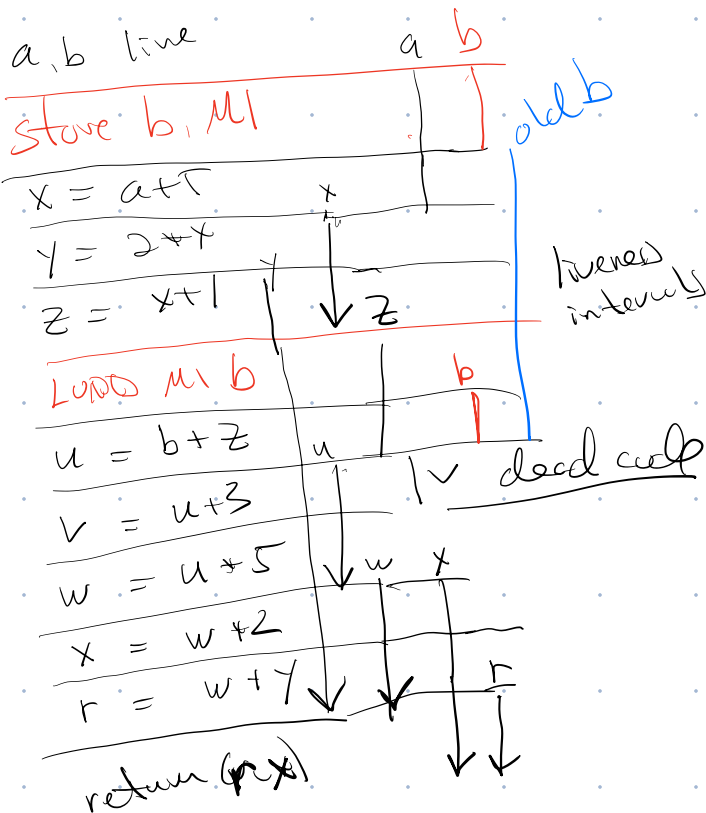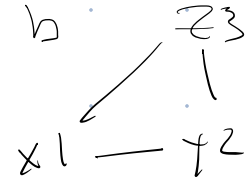Now w has < 3 edges so push on stack

Stack a, u, r, w

② **Spill** each node has $\geq k$ edges
So pick one to put in memory
say b

Memory b
Stack a u r e, ⓑ

③ (**Select Colors**)
b has no register

So rewrite code w
b stored in memory
and (**Start Over**)

Simpler graph ↙

a,b line	a	b
Store b, M1			oldb
x = a+5	x	
y = 2*x	y	
z = x+1	↓z	
Load M1 b		b
u = b+z	u	↓ dead code
v = u+3		
w = u+5	↓w x	
x = w+2		
r = w+y ↓ ↓	r	
return (r,x)		

liveness intervals
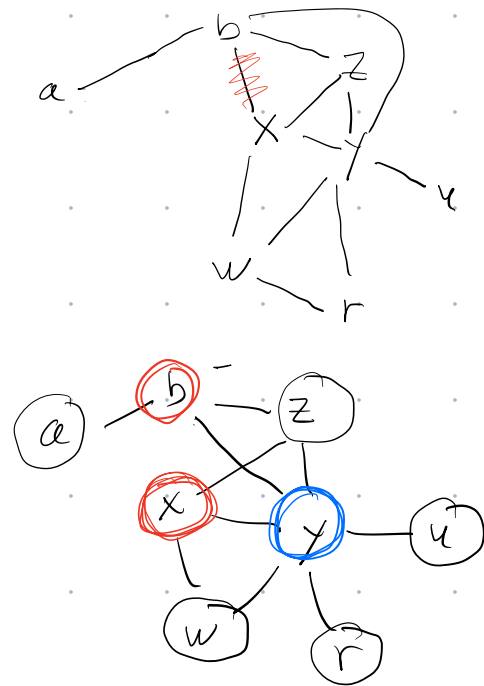
Stack
Simplify a, b, w, r, u, v, y, z

Rebuild graph from stack and
(Select colors)

R1 black
R2 blue
R3 red

Rewrite code write registers

a in R1

b in R3

Store R3, M1

R3 = R1 + 5

R2 = 2 + R3

R1 = R3 + 1

Load M1, R3

R1 = R3 + R1

dead code, delete

R1 = R1 + 5

R3 = R1 * 2

R1 = R1 + R2

return (r, x)

---

a, b live

Store b, M1

$x = a + 5$

$y = 2 + x$

$z = x + 1$

Load M1 b

$u = b + z$

$v = u + 3$

$w = u + 5$

$x = w + 2$

$r = w + y$

---

a b   old b

                liveness
                intervals

z b