

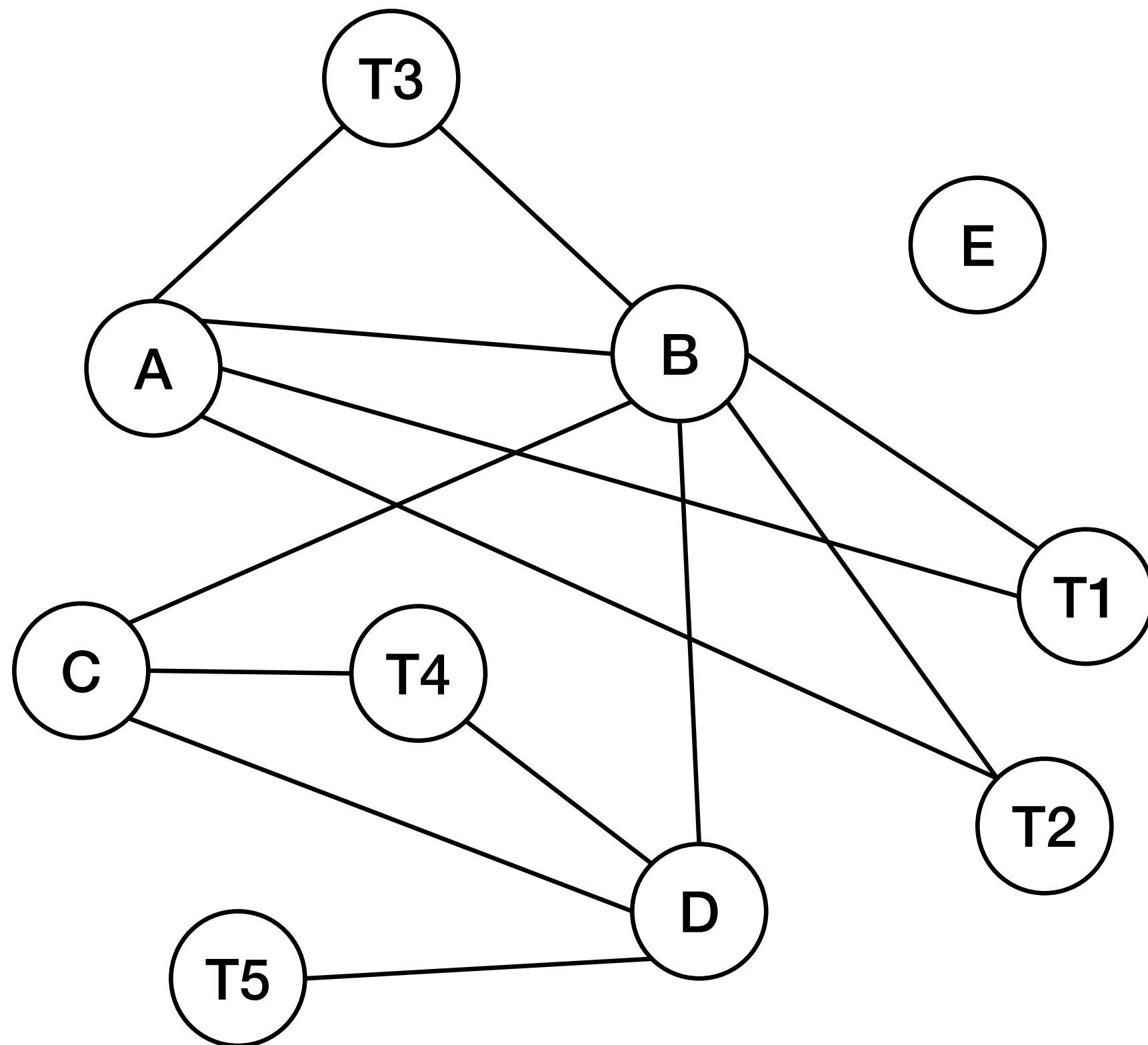
# Graph Coloring

# interference graph

- Two variables can be assigned to the same register *if they are not live at the same time*
  - They don't have values we need at the same time
- Graph  $G = (V, E)$  where
  - $V$  a set of vertices representing variables/temporaries
  - $E$  a set of edges of form  $(v_1, v_2)$  if  $v_1$  and  $v_2$  are live at the same time

1:	$T1 = A + B$	_____	[A, B]
2:	$T2 = A + T1$	_____	[A, B, T1]
3:	$T3 = A + T2$	_____	[A, B, T2]
4:	$D = A + T3$	_____	[A, B, T3]
5:	$T4 = C + B$	_____	[B, C, D]
6:	$T5 = T4 + C$	_____	[T4, C, D]
7:	$E = T5 + D$	_____	[T5, D]
		_____	[E]

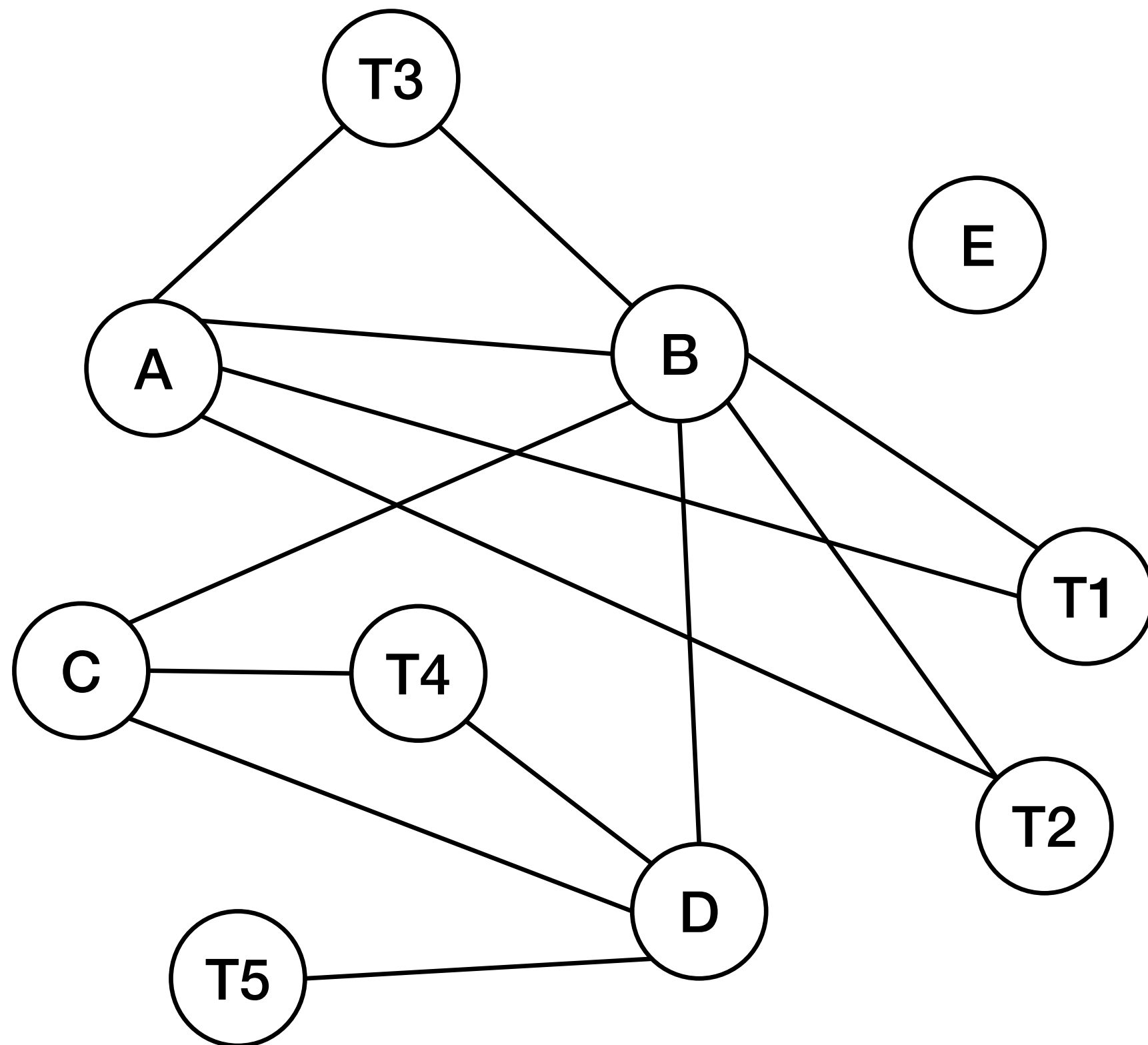
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6:  $T5 = T4 + C$  [T4, C, D]  
7:  $E = T5 + D$  [T5, D]  
[E]

# graph coloring

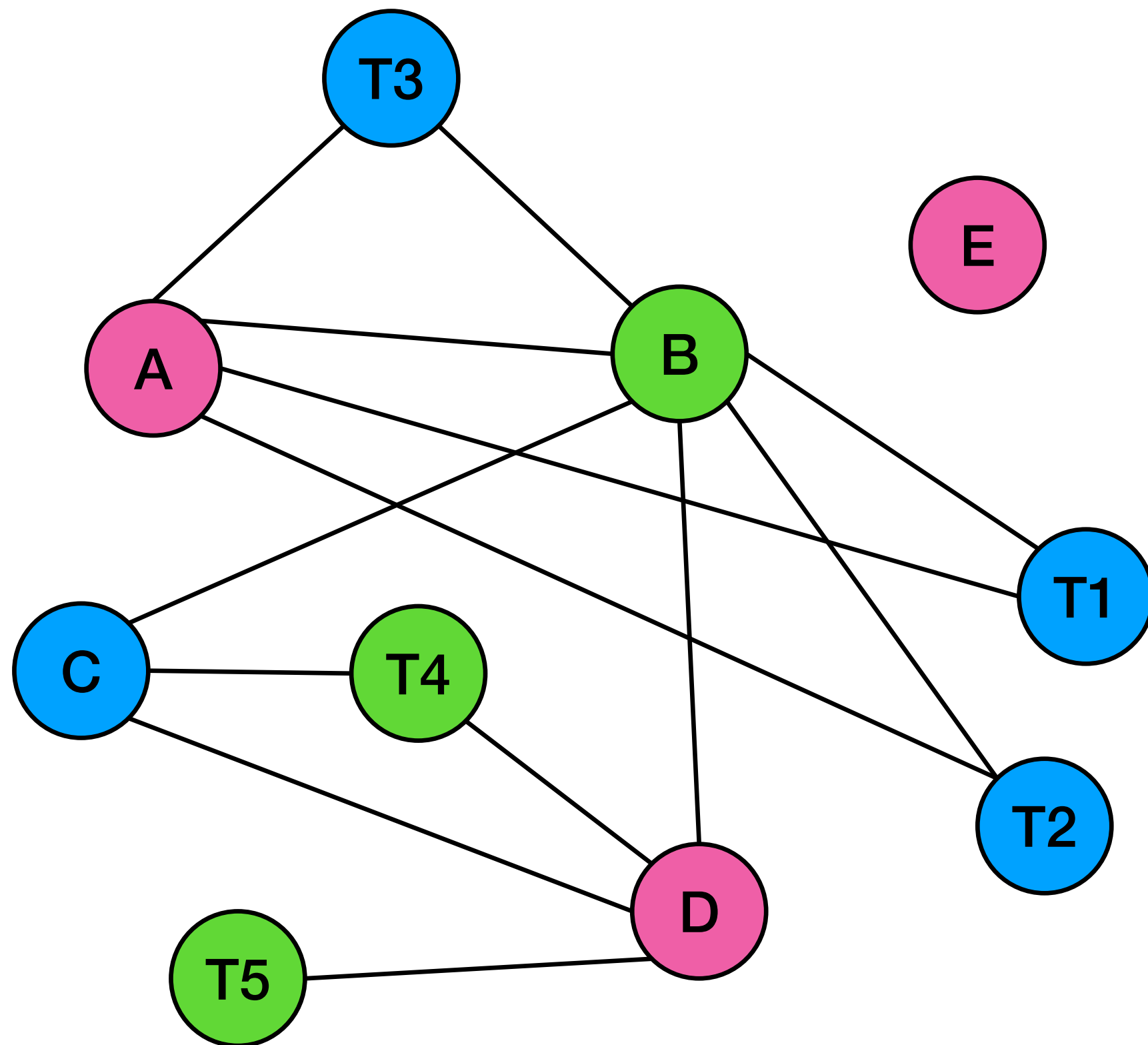
- Assign variables to registers by *coloring* the graph, one color per register



```
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7:  E  = T5 + D     [T5, D]
                        [E]
```

# graph coloring

- No vertices that share an edge get the same color



$$\begin{array}{l}
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 \quad \quad \quad \quad \quad \quad \text{---} [E]
 \end{array}$$



next: finding a minimum coloring