

### Homework 1

1. a) Mobility =  $3(L-1) - 2j_2 - j_1$   
 $= 3(4-1) - 2(4) - 0$   
 $= 3(3) - 8 - 0$   
 $= 9 - 8$   
 $= 1$

$$S + L \leq P + Q$$

$$162 + 73 \leq 77 + 135$$

$$235 \leq 212$$

Grashof condition is not satisfied

b)  $M = 3(L-1) - 2j_2 - j_1$   
 $= 3(4-1) - 2(4)$   
 $= 3(3) - 8$   
 $= 9 - 8$   
 $= 1$

$$S + L \leq P + Q$$

$$155 + 31 \leq 163 + 95$$

$$186 \leq 198$$

Grashof condition is satisfied

2.  $S + L \leq P + Q$   
 $462 + 159 \leq 350 + Q$   
 $621 \leq 350 + Q$   
 $271 \leq Q$

$$S + L \leq P + Q$$

$$462 + L \leq 159 + 350$$

$$462 + L \leq 509$$

$$L \leq 47$$

$$S + L \leq P + Q$$

$$S + 159 \leq 350 + 462$$

$$S \leq 653$$

$$S + L \leq P + Q$$

$$159 + 462 \leq p + 350$$

$$621 \leq p + 350$$

$$271 \leq p$$

$$0 < d \leq 47, \quad 271 \leq d \leq 653$$

↓

$$\{d \in (0, 47) \cup [271, 653]\}$$

