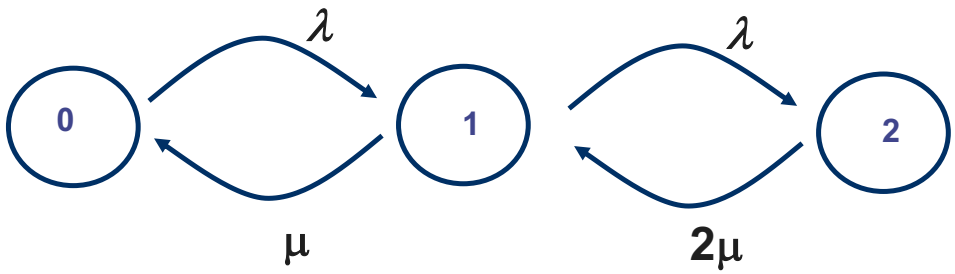
COMP9334 Revision Questions Week02B — Solution

Question 1

(a) The state transition diagram is:



The state transition rate from S_2 and S_1 should be 2μ. Note that in order for the state to move from S_2 to S_1, any one of the calls in the call centre has to finish. Consider a small time interval δ,

Prob[Transiting from S_2 to S_1]

$=$ Prob[Call at Operator 1 has finished OR Call at Operator 2 has finished]

$=$ Prob[Call at Operator 1 has finished] + Prob[Call at Operator 2 has finished] − Prob[Call at Operator 1 has finished AND Call at Operator 2 has finished]

$= \mu\delta + \mu\delta - (\mu\delta)^2$

$\approx 2\mu\delta$

(b) The state balance equations for States 1, 2 and 3 are respectively:

$$\lambda P_0 = \mu P_1 \quad (1)$$

$$\mu P_1 + \lambda P_1 = \lambda P_0 + 2\mu P_2 \quad (2)$$

$$\lambda P_1 = 2\mu P_2 \quad (3)$$