a. Arrival rates: $\lambda_i = \begin{cases} 20(1-\frac{i}{5}) & \text{if } i = 0,1,\dots,4 \\ 0 & \text{if } i = 5,6,\dots \end{cases}$ ← arrivals don't occur once there are 5 customers in the shop

Service rates: $\mu_i = \begin{cases} 10 & \text{if } i = 0,1,\dots,5 \\ 0 & \text{if } i = 6,7,\dots \end{cases}$ ← we never reach states with more than 5 customers in the shop – we can set these service rates to anything.

b. $d_0 = 1$

$$d_1 = \frac{\lambda_0}{\mu_1} = \frac{20}{10} = 2$$

$$d_2 = \frac{\lambda_0 \lambda_1}{\mu_1 \mu_2} = (2)^2\left(1-\frac{1}{5}\right) = \frac{16}{5}$$

$$d_3 = \frac{\lambda_0 \lambda_1 \lambda_2}{\mu_1 \mu_2 \mu_3} = (2)^3\left(1-\frac{1}{5}\right)\left(1-\frac{2}{5}\right) = \frac{96}{25}$$

$$d_4 = \frac{\lambda_0 \lambda_1 \lambda_2 \lambda_3}{\mu_1 \mu_2 \mu_3 \mu_4} = (2)^4\left(\frac{4}{5}\right)\left(\frac{3}{5}\right)\left(\frac{2}{5}\right) = \frac{384}{125}$$

$$d_5 = \frac{\lambda_0 \lambda_1 \lambda_2 \lambda_3 \lambda_4}{\mu_1 \mu_2 \mu_3 \mu_4 \mu_5} = (2)^5\left(\frac{4}{5}\right)\left(\frac{3}{5}\right)\left(\frac{2}{5}\right)\left(\frac{1}{5}\right) = \frac{768}{625}$$

$$d_6 = d_7 = d_8 = \cdots = 0$$

Let $D = \sum_{j=0}^{\infty} d_j \approx 14.341$

$\Rightarrow \pi_i = d_i / D$:

i	π_i
0	0.070
1	0.140
2	0.223
3	0.268
4	0.214
5	0.086
≥ 6	0