

- 7.7 Mr. Smith works on a temporary basis. The mean length of each job he gets is 3 months. If the amount of time he spends between jobs is exponentially distributed w/ mean 2, then @ what rate does Mr. Smith get new jobs?

$$\mu_j = 3 \text{ months} \quad \mu_{\text{bet}} \sim \exp(\mu = 2 \text{ months})$$

If Mr. Smith has a job for 3 months & has a 2 month break in between, then Mr. Smith on average gets a job every 5 months.

2. Monica works on a temporary basis. The mean length of each job she gets is 11 months. If the amount of time she spends between jobs is exponentially distributed w/ mean 3 months, then in long run what fraction of time does she spend working?

$$\mu_j = 11 \text{ months} \quad \mu_{\text{bet}} \sim \exp(\mu = 3 \text{ months})$$

Thm 3.4: In an alternating renewal process,  $\lim$  fraction of time in state 1 is:

$$\frac{\mu_F}{\mu_F + \mu_G}$$

Monica spends working  $\left( \frac{11}{11+3} = \frac{11}{14} \right) \approx 0.7857$   
in the long run



3. In front of Terminal C @ The Chicago airport is an area where hotel shuttle vans park. Customers arrive @ times of Poisson process w/ rate 10/hr looking for transportation to the Hilton hotel nearby. When 7 people are in the van, it leaves for 36 minute round trip to the hotel. Customers who arrive while the van is gone go to some other hotel instead.

- a. What fraction of the customers actually go to the Hilton?

10 customers  
hr

7 ppl in van  $\rightarrow$  36 min

if van gone  $\rightarrow$  diff hotel

$$\frac{10 \text{ customer}}{\text{hr}} \left( \frac{60 \text{ min}}{\text{hr}} \right) = \frac{6 \text{ min}}{\text{customer}} (7 \text{ customer}) = 42 \text{ min}$$

$$\text{Thm 3.4: } \frac{\mu_F}{\mu_F + \mu_G} \Rightarrow \frac{42}{42 + 36} = \frac{42}{78} = \frac{7}{13} = 0.5385$$

0.5385 customers actually go to the Hilton

- b. What is the average amount of time that person who actually goes to the Hilton ends up waiting in the van?

1 = 36 min  
2 = 30 min  
3 = 24 min  
4 = 18 min  
5 = 12 min  
6 = 6 min  
7 = 0 min  
126 min

6 min  
interarrival  
time

$$\begin{array}{r} 18 \\ 7 \overline{) 126} \\ \underline{7} \phantom{00} \\ 56 \end{array}$$

The average amount of time that a person who actually goes to the Hilton ends up waiting in the van is 18 minutes.