

LECTURE 5-7: EXERCISES

- (1) You are working with a population of sunflower whose heights are normally distributed ($\mu = 2.3m, \sigma = 0.5m$):
 - (a) if you pick a plant at random, what is the probability that its height is between 2.6 – 2.9 meters?
 - (b) if you pick a plant at random, what is the probability that its exactly 1.9 meters?
- (2) In one thousand throws (of 6 sided dice) what is the approximate probability that a 3 is obtained fewer then 145 times?
- (3) Suppose that requests to a web server follow the Poisson model with unknown rate r per minute. In a one hour period, the server receives 342 requests. Estimate r .
- (4) Suppose that requests to a web server follow the Poisson model, and that 10 requests come during a 5 minute period. Find the probability that at least 4 requests came during the first 3 minutes of the period.
- (5) Suppose that the length of a telephone call (in minutes) is exponentially distributed with rate parameter $r = 0.2$. Find the probability that the call lasts between 2 and 7 minutes. Find the μ, σ .
- (6) Suppose that the lifetime of a certain electronic component (in hours) is exponentially distributed with rate parameter $r = 0.001$. Find the probability that the component lasts at least 2000 hours. Find the μ, σ .
- (7) A company accepts orders for their product either by telephone or on-line. The mean number of sales per day are: telephone order: 1.5 on-line purchase: 2.5 What is the probability of the company receiving exactly 2 orders on one day?
- (8) A family categorizes the mail received each day into three types; financial (bills, communications from the bank, etc), circulars (and all kinds of junk mail) and personal (letters from friends, etc). The three types may each be modeled by independent Poisson distributions with means 1.1, 1.8 and 1.3 items of mail per day. Find the probability that in any one day
 - (a) the number of items of mail that are personal or financial exceeds 3,
 - (b) the total number of items of mail is less than 5.
- (9) A mail order company receives a steady supply of orders by telephone. The manager wants to investigate the pattern of calls received so he records the number of calls received per day over a period of 40 days as follows.

#calls per day	0	1	2	3	4	5	>5
Measured values	8	13	10	6	2	1	0

- (a) Calculate the mean and variance of the data.
- (b) State whether the conditions for using the Poisson distribution as a model apply. Use the Poisson distribution to predict the frequencies of 0, 1, 2, 3... calls per hour.