EE 381 Homework 3 - Part 2

This homework is due with additional parts in dropbox (beginning of laboratory section) on 3-8-2021.

Applications of de Moivre - Laplace

Using the normal distribution to approximate the binomial distribution.

Both $np \geq 5$ and $nq \geq 5$.

$\mu = np$ and $\sigma = \sqrt{npq}$

Continuity correction.

Binomial	Normal
When finding:	Use:
$P(\{X = a\})$	$P(\{a - 0.5 < X < a + 0.5\})$
$P(\{X \geq a\})$	$P(\{X > a - 0.5\})$
$P(X > a\})$	$P(\{X > a + 0.5\})$
$P(\{X \leq a\})$	$P(\{X < a + 0.5\})$
$P(\{X < a\})$	$P(\{X < a - 0.5\})$

Exercise.

According to recent surveys, 60% of households have energy efficient air conditioning. If a random sample of 180 households is selected, what is the probability that more than 60 but fewer than 100 have energy efficient air conditioning?

Exercise. (Returning to a problem discussed in lecture…)

A rental firm has three locations. A truck rented at one location may be returned to any of the locations. The company's records show the probability of a truck rented at one location being returned to another. From these records the transition matrix is formed.

	Returned to			
Rented from		I	II	III
	I	0.8	0.1	0.1
	II	0.3	0.6	0.1
	III	0.1	0.2	0.7

If (on day one) a truck is rented at location II, find the probability for each location that it will be at that location on the third day.

Exercise.

Employees at the ACME paper bag corporation have two fast food restaurant chains located next to the corporate parking lot: Carl's Jr. and Wendy's. Due to time restrictions the ACME employees eat their lunches either at Carl's Jr. or Wendy's and nowhere else. If today an employee eats lunch at Wendy's, then tomorrow the probability they'll eat lunch at Wendy's is 10% otherwise they'll eat lunch at Carl's Jr. If today an employee eats lunch at Carl's Jr., then tomorrow the probability they'll eat lunch at Carl's Jr. is 40% otherwise they'll eat lunch at Wendy's. If on Monday an employee eats lunch at Carl's Jr. what is the probability they'll eat lunch at Carl's Jr. Wednesday? (No absences or other unusual circumstances.)

Exercise.

What is the 'state diagram' and steady state of the Markov matrix below?

$$\Pi = \begin{bmatrix} 0.2 & 0.8 \\ 0.6 & 0.4 \end{bmatrix}$$

Exercise.

Noise levels at various area urban hospitals were measured in decibels. The sample mean of the noise levels in 84 corridors was 61.2 decibels, and the population standard deviation was 7.9 decibels. Find the 95% confidence interval of the true mean noise levels.