

# ECE 341 - Homework #8

Queueing Theory & Normal Distributions. Due Tuesday, June 3rd

## Queueing Theory

Assume you are running a fast-food restaurant.

- The time between customers arriving at a restaurant is an exponential distribution with a mean of 60 seconds.
- The time it takes to serve each customer is an exponential distribution with a mean of 40 seconds.

1) Run a single Monte-Carlo simulation for this restaurant over the span of one hour.

- Give the formula for each column in your simulation
- What is the longest waiting time for a customer in your simulation?
- What is the largest queue over the span of one hour?

## Normal Distribution

The low for the month has been measured at Hector Airport since 1942. The mean and standard deviations are:

Month	May	June	July	Aug	Sept	Oct
Mean	27.4013F	40.2179F	46.2949F	43.2321F	30.5526F	19.3462F
st dev	4.4236F	3.9924F	3.9481F	4.1435F	4.8050F	5.1265F

[http://www.bisonacademy.com/ECE111/Code/Fargo\\_Weather\\_Monthly\\_Low.txt](http://www.bisonacademy.com/ECE111/Code/Fargo_Weather_Monthly_Low.txt)

2) What is the probability that we will have a killing frost (temperature drops below 30F) in

- May
- June
- July

## Rainfall

The rainfall in Fargo each month (in inches) is

Month	May	June	July	Aug	Sept	Oct
Mean	2.6549	3.5025	2.9668	2.6529	2.1344	1.694
st dev	1.6536	2.1054	1.9505	1.7339	1.4913	1.4619

3) What is the probability that we will get more than 10 inches of rain in the months of June, July, and August (combined)?

4) What is the probability that we will get no rain over these 6 months