- You have 60 minutes to complete this exam.
- You may refer to your book and notes.
- You may use a hand-held calculator, or the calculator application on a PDA or palm computer, to do basic arithmetic. Any other type of electronic computation is **not** allowed.
- Present your work in an organized and <u>neat</u> fashion.
- Clearly state and explain your assumptions (if any), statements, and arguments. Your grade will be significantly affected by the clarity of your answers.
- To receive full credit, you must explain your answers and show all your work.

Problem	1	2	3	4	Total
Possible Score	10	10	10	10	40
Your score					

Last Name:

First Name:

(10 pts.) A recent study has found that the volume of trading on New York Stock Exchange (NYSE) approximately follows a normal distribution with an average daily volume of 646 million shares traded and a standard deviation of about 100 million shares. Assuming this model accurate, answer the following questions:

(a) What is the probability trading volume will be less than 400 million shares?

(b) What percentage of the time does the trading volume exceed 800 million shares?

(c) If the NYSE wants to issue a press release on the top 5% of trading days, what volume of trading would trigger a release on a given day?

(10 pts.) In a recent study, the average time between placing an order and receiving the order at SuperSonic Drive Thru restaurants was 2.78 minutes. Assuming that waiting times such as these frequently follow an exponential distribution, answer the following questions.

(a) What is the probability that a customer's service time is less than 2 minutes?

(b) What is the probability that a customer's service time is less than 2.78 minutes?

(c) What is the probability that a customer's service time is more than 5 minutes?

(10 pts.)

An oil company purchased an option on land in Alaska. Preliminary geologic studies assigned the following prior probabilities of finding oil on the land:

P(high-quality oil) = 0.50P(medium-quality oil) = 0.20P(no oil) = 0.30

(a) What is the probability of finding oil?

(b) After purchasing the land, but before drilling any wells, a soil sample is taken. A test of the soil reveals the presense of a certain mineral. The probabilities of finding the particular type of mineral identified by the test are

P(mineral high-quality oil)	=	0.20
P(mineral medium-quality oil)	=	0.80
P(mineral no oil)	=	0.20

What is the new (posterior) probability of finding oil on the land?

(10 pts.)

Military radar and missile detection systems are designed to warn of enemy attacks on a particular site. A reliability question deals with the ability of the detection system to identify an attack and issue the warning. Assume that a particular system, called the Grand Prairie Detection System (GPDS) has a 0.90 probability of detecting a missile attack.

(a) What is the probability of detecting a missile attack launched at a military site if one GPDS is installed at the site?

(b) What is the probability of detecting a missile attack launched at a military site if two GPDSs are installed at the site? In this case, an attack is detected if at least one of the two systems detects it.

(c) What is the probability of detecting a missile attack launched at a military site if three GPDSs are installed at the site? In this case, an attack is detected if at least one of the three systems detects it.

(d) A competitor's system has a 0.80 probability of detecting a missile attack. How many of these systems would need to be installed to have the same reliability as using three GPDSs?