This homework assignment is due at the beginning of class on October 8, 2014.

Instructions: Use proper probability notation for all parts of each problem. Show all work in order to receive full credit. For all normal distribution include a graph indicating the mean and shade the area under investigation. For your own sake be neat.

Problem #1

Foxnews.com-- While it’s true that most Americans don’t own a passport, the blue book with its gold-embossed eagle, inspires something different in those who are in possession of one.

Some 13.8 million passports were issued in 2010, up from the 3.2 million issued 30 years ago. Before September 11, 2001, there were only about 50 million valid passports in circulation. Today, that number has doubled, to 102 million valid passports, or about 35% percent of the population.

In a current sample of 20 United States citizens:

a) How many people would you expect to have a passport?
b) Compute the variance and standard deviation of the number of people who own their own passports.
c) What is the probability that 10 people will have their own passport?
d) What is the probability six or fewer people have their own passport?
e) What is the probability at least 17 people have their own passport?
f) What is the probability ten, eleven, or twelve people have their own passport?
g) Suppose a corrected news article listed that 32.6% percent of the population now has a valid passport. What is the probability that of the 20 people sampled, exactly six will have a valid passport?
Some say the experience of going to a Major League Baseball game is priceless. And once you take in the size of that huge, green field or feel the hot sun burning the bridge of your nose while yelling at no player in particular, you have to agree.

As businesses, ballparks also understand the importance of providing value to their fans, and in terms of dollars and cents, some teams do a remarkably better job than others.

On average 70 percent of individuals that go to see professional baseball game will return for a second game.

a) In a sample of 10 spectators, what is the probability 7 will return for another game?
b) In a sample of 12 spectators, what is the probability at least 8 will return for another game?
c) In a sample of 15 spectators, what is the probability no more than 10 will return?
d) In a sample of 9 spectators, what is the probability that 3, 4, 5, or 6 will return?
Problem #3

According to the *SRDS Lifestyles Market Analyst*, 81,809 households in the Lincoln, Hastings, and Kearney area own a cat. This means 30 percent of the households own a cat. Meanwhile, 106,351 households or 40 percent of households own a dog.

In a sample of 20 area households:

a) What is the probability that at least 3 are cat owners?
b) What is the probability that no one is a cat owner?
c) What is the probability that fewer than 13 are dog owners?
d) What is the probability that 7, 8, 9, or 10 are dog owners?
Problem #4

Foxnews.com--An exotic super fruit called 'African Mango' is quickly becoming America's hottest new way to lose weight.

According to a recent study published in the scientific journal Lipids in Health and Disease, men and women supplementing with African Mango extract for just 28 days lost an astonishing 3,990% more weight than those taking a placebo (8.9 lbs. vs. 0.22 lbs.). Individuals take African Mango extract 30 minutes before meals and on average have lost 8.9 pounds in 28 days.

(carry all work to 4 decimal points for this problem)

a) When taking African Mango extract before meals, what is the expected weight loss for one week (7 days)?

b) When taking African Mango extract before meals, what is the expected weight loss for five days?

c) What is the probability of losing 2 pounds in 5 days?
Problem #5

CNN.com—How many homes do you think a real estate agent sells in a year? Ten? Maybe a couple dozen in a really good year? Well, it turns out the average agent does seven “sides” — that is, represents either a buyer or seller in a home transaction — in the course of a year. So it is pretty remarkable that there’s an agent in Las Vegas who did 931 last year.

In fact, our Vegas mega-agent, Jared Jones of Horizon Realty Group, is not even the most successful agent in the country. According to a list known as “The Thousand,” put out each year by The Wall Street Journal, he’s only No. 4. The top real estate pro on the list of agents by number of transaction sides, Mike Phillips (Kansas City, Missouri) did 1,268 sides last year. That is about four transactions a day.

If a Kearney semi-super-agent sells or lists (a side) nine houses per year, what is the probability that they will have:

a) no sides in one year?

b) 3 or fewer sides in four months?

c) 4 or more sides in six months?

d) 5, 6, or 7 sides in eight months?
Problem #6

Auctions are designed to be fast paced, creating an excitement that drives up the price of something by competitive bidding. That being the case, it comes as no surprise that some items reach truly astronomical prices by the time the winning bid is accepted. We are not talking about putting the old vinyl records in your basement on eBay. For instance, would you believe that one man bid (and paid) over $100 million for a painting? This is an example of a runaway auction.

Suppose, on average an auctioneer can sell 9 items in 10 minutes.

a) What is the average number of items sold in 4 minutes?
b) Compute the probability of less than 3 items being sold in 7 minutes?
c) Compute the probability of 5 or more items being sold in 5 minutes?
d) Compute the probability of exactly 10 items being sold in 10 minutes?
Problem #7

About.com--So what is a good ACT score? The exam consists of four parts: English Language, Reading, Mathematics and Science. Each category receives a score between 1 (lowest) and 36 (highest). Those four scores are then averaged to generate the composite score used by most colleges. The average composite score is roughly a 21. That is, about 50% of test-takers score below a 21.

Assuming that ACT scores are normally distributed:

a) Suppose you learn 5% of students that take the ACT test score at least a 34, what is the standard deviation of the scores?

b) What is the probability randomly selecting a student who has a score falling between a 17 and a 25 on the ACT?

c) The top 3 percent of the students’ have at least what score?
Problem #8

CDC.gov--Body Mass Index (BMI) is a number calculated from a person’s weight and height. BMI is a fairly reliable indicator of body fatness for most people. BMI can be considered an alternative for direct measures of body fat. Additionally, BMI is an inexpensive and easy-to-perform method of screening for weight categories that may lead to health problems.

An average body mass index is 21.7 BMIs with a standard deviation of 3 BMIs. Assuming that BMI scores are normally distributed:

a) If a randomly chosen individual would compute his BMI, what is the probability that he will have a BMI that is greater than 28.9?

b) What is the probability of a randomly chosen individual having a BMI of 15.3 or less?

c) What is the probability of a randomly chosen individual having a BMI that fall in the range of 17.5 to 22.5?
NFL.com—More than 300 top prospects for the 2012 NFL Draft will be invited to participate at “The Combine” in Lucas Oil Stadium in Indianapolis. This event is a vital step in athletes achieving their NFL dreams.

Athletes from all positions will perform the 40-yard dash, broad jump, bench press, 3-cone drill, shuttle run, and vertical jump.

The best 40 yard dash time to this date is 4.24 seconds ran by Chris Johnson in 2008 and Rondel Melendez in 1999. The average 40 yard dash time for the wide receiver position for the 2011 NFL combine was 4.53 seconds. The standard deviation was .081 seconds.

Assuming that times are normally distributed and all participants are randomly selected.

a) What is the probability of a wide receiver participant in “The Combine” runs a 4.33 or slower?

b) What is the probability that a wide receiver participant in “The Combine” will run a 4.40 or faster?

c) How fast would a wide receiver have to run to run faster than 99% of the other 40 yard dash times?

d) How fast would a wide receiver have to run to be in the top 95% of the 40 yard dash times?