(1) Stat 10 Survey. A friend argues that a Stat 10 student who lives on-campus is more likely to have an iPod than a student who lives off-campus. Do these data from a random sample of all UCLA students enrolled in Stat 10 support your friends claim? Justify your answer with specific calculations.

stats10Fall08

		ipod		Row
		yes	no	Summary
oncampus	yes	95	13	108
	no	69	6	75
Column Summary		164	19	183

S1 = count ( )

(2) Lost iPod. Use the table in the previous problem to solve this problem.

a) After class when you find an iPod, what are chances that it belongs to a student who lives off-campus?

b) Are the events "has an iPod" independent of "live on campus"? Explain.

c) Are the events "has an iPod" and "live on campus" mutually exclusive? Explain.

d) If two events are mutually exclusive, is it possible for them to also be independent? Explain.

(3) Body Mass Index (BMI). BMI of healthy American males follows a normal distribution with mean 24.5 and standard deviation 3.0 while the mean BMI for healthy American women is 22.5 and standard deviation 3.0.

a) What is the cut-off BMI for the healthy American male at the 90th percentile?

b) If you learn that an individual has a BMI of 19.6, would you expect that person to be male or female? Include a sketch and appropriate labels and justify your answer.

c) If you select 3 females records at random, what is the probability that all 3 have BMIs of 25.5 or higher?

(4) Nitric Oxide. Hypoxic respiratory failure is a serious condition that affects some newborns. If a newborn has this condition, it is often necessary to use extracorporeal membrane oxygenation (ECMO) to save the life of the child. However, ECMO is an invasive procedure that involves inserting a tube into a vein or artery near the heart, so physicians hope to avoid the need for it. One treatment for hypoxic respiratory failure is to have a newborn inhale nitric oxide. To test the effectiveness of this treatment, 80% of the newborns suffering from hypoxic respiratory failure were randomly assigned to the treatment group and given nitric oxide while 20% were assigned to a control group. In the treatment group 46% of the newborns had a negative outcome, meaning they needed ECMO or they died. In the control group, 64% of the newborns had a negative reaction.

a) If we select a newborn at random from this group, what is the probability that the baby has a negative reaction?

b) If we know that the baby had a negative reaction, what are the chances that the newborn received the nitric oxide treatment?

c) If 400 newborns suffering from hypoxic respiratory failure were enrolled in this study, about how many would we expect to have a positive reaction?

(5) More babies. Birth records in the US suggest that the probability that a baby will be a girl is about 51%. Let X represent the number of girls in a family of three children.

a) Write the probability distribution function for X. You should do this in a form of a two-column table, in which one column consists of the possible values of X and the other their probabilities.

b) Is the probability distribution an example of a binomial distribution? If yes, explain why. If no, explain where it fails.

c) Find the probability of at least one girl. Find the probability of at most 1 girl.

d) Find the Expected Value and Standard Deviation of X.

(6) Games. In this game, you roll a fair, six-sided die. If it is odd, you win $6. If it is a 2 or 4, you lose $9. If it is a 6, you lose $3.

x	6	-9	-3
$P(X = x)$	1/2	1/3	1/6

a) Is this a "fair" game? Use the Expected Value and Standard Deviation of X to explain why this game is or is not fair. (You should calculate both.)

b) Suppose you play twice. Let X_1 represent the winnings on the first play, and X_2 the winnings of the second play. Find the expected value and standard deviation of $Y = X_1 + X_2$.

c) What does Y represent?