MATH 106 QUIZ 5   September, 2012   Instructor: S. Sands
NAME: _____
I have completed this assignment myself, working independently and not consulting anyone except the instructor.

INSTRUCTIONS
- The quiz is worth 100 points. There are 6 problems. This quiz is *open book* and *open notes*. This means that you may refer to your textbook, notes, and online classroom materials, but *you must work independently and may not consult anyone* (and confirm this with your submission). You may take as much time as you wish, provided you turn in your quiz no later than **Sunday, September 30**.
- <u>**Show work/explanation where indicated. Answers without any work may earn little, if any, credit.**</u> You may type or write your work in your copy of the quiz, or if you prefer, create a document containing your work. Scanned work is acceptable also. **In your document, be sure to include your name and the assertion of independence of work.**
- General quiz tips and instructions for submitting work are posted in the Quizzes & Exams conference.
- If you have any questions, please contact me by e-mail or phone (540-338-7120).

1. (14 pts) There are two coin purses. The first coin purse contains a nickel N and a dime, D. The second coin purse contains a penny P and a quarter Q.

From the first purse a coin is randomly chosen, and from the second purse, a coin is randomly chosen, and the outcome is recorded. [For instance, the outcome (N, P) means Nickel from the first purse and Quarter from the second purse.]

(a) List all of the outcomes in the sample space.

(b) Let A be the event "the sum of the coin values is an odd number of cents."

    What outcomes belong to event A? (Just list them).

     What is the probability of event A? _____

(c) Let B be the event "the sum of the coin values is between 20 cents and 50 cents."

    What outcomes belong to event B? (Just list them).

    What is the probability of event B? _____

(d) Determine the probability P(A ∪ B), where A and B are the events described above. Show work/explanation.

2. (6 pts) The probability that a particular football team wins its next game is 5/7. What are the **odds for** the team winning it next game? What are the **odds against** the team winning its next game?

3. (16 pts) A collection of 16 single-serving ice cream cups consists of 11 chocolate ice cream cups and 5 vanilla ice cream cups.

7 of the ice cream cups are randomly selected by guests at a party.

What is the probability that the 7 randomly selected consist of 4 chocolate ice cream cups and 3 vanilla ice cream cups? **Show work/explanation.**

4. (15 pts) For a certain game of chance, a player loses $4 with a probability of 0.35, breaks even with probability 0.10, gains $1 with probability 0.20, gains $2 with probability 0.30, and gains $6 with probability 0.05. This information is summarized in the table below (extra space provided for computations.)

| Payoff Table					
x_i	−$4	$0	$1	$2	$6
p_i	0.35	0.10	0.20	0.30	0.05

(a) A player plays this game of chance one time. What is the probability that the player will win some money? **Show work/explanation**.

(b) If the player plays the game many times, what is the player's expectation? That is, what is the **expected value** of the probability distribution? Is this a **fair game**?
Show work. (You are welcome to use the extra row and/or column in the table to make it easier to carry out the computation.)

5. (25 pts) Medicines to relieve headache pain include Drug X and Drug Y. A study was carried out, tracking 100 patients suffering from a particular kind of headache, migraine headaches. Each patient was treated for two migraine headaches. For one migraine headache, Drug X was administered, and for the other, Drug Y was administered. Given a randomly selected patient, the study found that Drug X relieved a migraine headache for 44 of the patients, Drug Y relieved a migraine headache for 53 patients, and Drugs X and Y both relieved the migraine headaches for 17 patients.

(a) Let X = "Drug X relieved migraine" and Y = "Drug Y relieved migraine". Complete the following Venn diagram, filling in the appropriate **number of patients** in each of the regions.
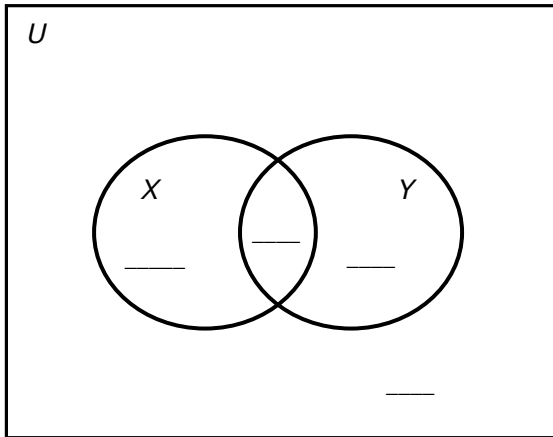
(b) Let event X = "Drug X relieved migraine" and event Y = "Drug Y relieved migraine". Fill in the associated probability table with the appropriate **probabilities** (No work/explanation required)

	Y	Y′	Totals
X			
X′			
Totals			

(d) Given a randomly selected patient, state the probability that Drug X or Drug Y (or both) relieved a migraine headache.

(c) Given a randomly selected patient, state the probability that Drug X did not relieve the migraine headache.

(e) Given a randomly selected patient, state the probability that Drug Y relieved a migraine headache but Drug X did not.

(f) Given a randomly selected patient, state the probability that neither Drug X nor Drug Y relieved a migraine headache.

6. (24 pts) The table below gives the distribution of blood types by sex in a group of 600 individuals.

Blood Type	Female	Male	Total
O	100	180	280
A	16	162	178
B	36	72	108
AB	8	26	34
Total	160	440	600

(Answers for parts a through f can be stated as fractions, such as 35/46, or as decimals rounded to three decimal places)

A person is selected at random from the group.
What is the probability that the person:

(a) is male?

(b) has blood type B?

(c) is a male having blood type B?

(d) is a male or has blood type B?

(e) is male, given that the person's blood type is B?

(f) has blood type B, given that the person is male?

Consider the events M = "person is male" and B = "person has blood type B".
   (g) Are the events M and B independent? **Explain carefully.**