Mth 21, Homework 5 on sections 3.2, 3.3

Due by Mon, Nov 3.

Please use lots of space and explain your answers, showing clearly any work you had to do. Each question is worth 3 points.

Section 3.2 Basic terms of probability

(1) Roll a die.

- **(a)** In the language of probability, what is the *experiment* here?
- **(b)** What is the *sample space*?
- **(c)** Let E be the event that you roll a 4 or a 5. So $E = \{4, 5\}$. Compute $p(E)$ which means the probability of E happening.

(2) Give the odds of event E in Question 1. (Remember odds are a ratio of successes to failures.)

(3) A pack of cards is shuffled and you pick a card.

- **(a)** How many elements does the sample space have here?
- **(b)** What is the probability that you pick a diamond?
- **(c)** Let E be the event that you pick a Queen or a King. Compute $p(E)$ which means the probability of E happening.

(The four suits are clubs, diamonds, hearts and spades. Each suit has Ace, King, Queen, Jack and then ten down to 2.)

(4) A jar contains jellybeans with only 5 red, 7 black and 8 yellow beans.

- **(a)** You pick a bean without looking. What is the probability that it is red?
- **(b)** What are the odds that it is red?
- **(c)** What is the probability that it is not yellow?

(5) In a clinical trial of a drug, 60 out of 500 patients found it cured their condition. What is the probability of the drug curing a similar patient?

Section 3.3 Basic rules of probability

(6) Two dice are rolled. Let E be the event that sum of the numbers is 5 or less. Let F be the event that you roll a double (both dice the same number).

(a) What is $n(S)$, the size of the sample space here?

(b) Compute $p(E)$, the probability of E happening, using the key formula $p(E) = n(E)/n(S)$.

(c) Compute $p(F)$ the same way.

(7) Let E' be the event that E in question 6 does not happen (called the complementary event). Use a rule of probability to compute $p(E')$.

(8) For the events E and F in question 6 find

(a) $p(E \cap F)$ which means both events happening together,

(b) $p(E \cup F)$ which means either event happening or both.

(Hint: you can use a rule of probability to compute part (b).)

(9) Suppose the probability of winning prize X in a raffle draw is 0.3 and the probability of winning prize Y is 0.2. Also the probability of winning both is 0.1. Find the probability that you win prize X or prize Y.

(10) A pack of cards is shuffled and you pick a card. Let E be the event that you pick a heart. Let F be the event that you pick a club.

(a) What is $n(S)$, the size of the sample space here?

(b) Compute $p(E)$.

(c) Compute $p(F)$.

(d) Compute $p(E \cap F)$. Are these events *mutually exclusive*?

(e) Compute $p(E \cup F)$, the probability of picking a heart or a club.

If you get stuck on a question or aren't sure if you understand it:

- Go over the relevant class notes and section in the textbook.
- Check if you get the right answer for a similar odd-numbered question in the textbook (answers at the back of the book).
- Ask me about it after class.
- Come to my office hours: Mon 11:30 - 12:30, Wed 11:30 - 12:30 in CP 317.
- Go to the Math Tutorial Lab in-person in CP 303 or online.