This homework is a set of relatively easy exercises in basic probability. Print the sheets, write your name and the right answers on them, staple them to ensure you don't have sheets go astray, and hand in end of class 17 Sep. This exercise should be done individually. Several have been lifted from the wonderful book "Elementary probability for applications" by Rick Durrett.

Name:

1) You want to perform an experiment where you draw two cards from a standard deck of playing cards. For some reason, you are interested in the behavior of the king of spades (K) and the ace of diamonds (A); all other cards are junk cards (R=rubbish). What is an appropriate sample space?

2) I have a four sided die. I roll it once.

      2a) The following collection of sets is not an event space:

          {emptyset, {1234}, {12}}

      What is the one set I need to add to make an event space?

      2b) Why is this collection of sets not an event space?

          {emptyset, {1234}, {12}, {23}}

      2c) What sets do you need to add?

3) I draw three playing cards from a standard deck, without replacement.

    3a) Describe the space of outcomes (briefly - don't try to write it out).

    3b) How many elements does it have?

    3c) Assume that each element of the space of outcomes has the same probability. What is the probability that all three cards have the same suit? (with working)

4) Suppose we roll three dice. Compute the probability that the sum is

    4a) 3

    4b) 18

    4c) 9

5) A family has 3 children, each of which is a boy or a girl with probability 1/2. Let A be the event that there is at most 1 girl; let B be the event that the family has children of both genders.

    5a) Are A and B independent?

    5b) Are A and B independent if the family has 4 children?

6) Suppose we roll a red die and a green die. Let A be the event the red die shows a 2 or a 5 and let B be the event that the sum of the two dice is at least 7. Are A and B independent? (with working)

7) Roll 2 dice. Let A be the event that the sum is even and B be the event that the sum is divisible by 3 (i.e. is 3, 6, 9, 12). Are A and B independent? (with working)

8) Assume the gender of a child is assigned independently, with probability 1/2 for girl and 1/2 for boy, at birth.

    8a)   How many children would a couple need to have to have a 90% probability of having a girl?

    8b)   How many children would a couple need to have to have a 99% probability of having a girl?

9) In a group of students, 25% smoke cigarettes, 60% drink alcohol, and 15% do both. What fraction of students has at least one of these habits?

10) Suppose a sample space is {a, b, c}. We have P({a, b})=0.7 and P({b, c})=0.6.

     10a) Compute P({a})

     10b) Compute P({b})