I. A fair coin and a fair six-sided die are both tossed and the result is recorded using an ordered pair with the coin toss (H or T) first and the die face (1,…,6) second, (i.e. H3 is an outcome). Please answer the following questions concerning this experiment. (2 points each – 12 total).

a. Find the sample space S for the experiment:

$S =$

Let A be the event that the coin toss is a head and B be the event that the die shows an even number. Find each of the following events (i.e. find the set of outcomes that comprises each of these events):

b. $A =$

c. $B =$

d. $A \cap B =$

e. $A^C \cap B =$

Assuming all outcomes in the sample space are equally likely, find the indicated probability:

f. $P(A \cup B) =$

II. Suppose P is a probability function on a sample space S and A and B are events in S such that
$$P(A) = 0.45,$$
$$P(B) = 0.65, \text{ and}$$
$$P(A \cup B) = 0.85$$

Find each of the following probabilities. You must show at least one intermediate step for your answers (i.e. no work shown implies no credit!). Clearly indicate your answers. (2 points each – 8 total)

a. $P(A \cap B)$

b. $P(A')$

c. $P(A \cap B^C)$

d. $P(A' \cup B')$