

I. A pair of dice is rolled.

- A. What is the sample space?
- B. The sum of the numbers on the two dice is a *function from sample space to the integers*. Can you graph this function? (We call this function a *random variable*. We denote it  $X$ .)
- C. Assume the dice are fair. Find the probability of each value of the function in the previous problem, *i.e.*, find  $P(X = 2)$ ,  $P(X = 3)$ , etc.. How can you graph this data? (We called the *probability mass function*.)
- D. Define  $F(t) = P(X \leq t)$ . Graph  $F$ . (This is called a *distribution function*, or *cumulative distribution function*.)
- E. A coin is flipped  $n$  times. Is there a random variable associated with this experiment? A probability mass function? A cumulative distribution function?

II. A biased coin lands on heads 60% of the time and on tails 40% of the time.

- A. If it's flipped 3 times, what's the probability of no heads? Of 1 head? Of 2 heads? Of 3 heads? Graph the probability mass function. Graph the distribution function.
- B. What if it's flipped 4 times?
- C. What if it's flipped 100 times?

III. A biased coin lands on heads with probability  $p$ , and on tails with probability  $1-p$ . If it's flipped  $n$  times, what the probability of  $j$  heads? Is there a random variable here? A probability mass function?