Math 1313 Section 7.1

Section 7.1: Random Variables

A rule that assigns a number to each outcome of an experiment is called a random variable.

We can construct the probability distribution associated with a random variable

If $x_1, x_2, x_3, \ldots, x_n$ are values assumed by the random variable X with associated probabilities $P(X= x_1), P(X= x_2), \ldots, P(X= x_n)$, respectively, then the probability distribution of X may be expressed in the following way.

x	$P(X=x)$
x_1	$P(X= x_1)=p_1$
x_2	$P(X= x_2)=p_2$
.	.
.	.
.	.
x_n	$P(X= x_n)=p_n$

We can also graphically represent the probability distribution of a R.V.

A bar graph which represents the probability distribution of a random variable is called a histogram.

EX:

Example 1: The probability distribution of the random variable X is shown in the accompanying table:

x	-2	-1	0	1	2	3
$P(X=x)$	0.01	0.11	0.20	0.32	0.21	0.15

Find:

a. P(X = -2)

b. $P(-1 \leq X < 1)$

c. P(X > 0)

Example 2: A survey was conducted by the Public Housing Authority in a certain community among 920 families to determine the distribution of families by size.

The results follow:

Family Size	2	3	4	5
Frequency of Occurrence	350	200	245	125

a. Let *X* denote the number of persons in a randomly chosen family. Find the probability distribution for this experiment.

b. Draw the histogram corresponding to the probability distribution in part a.

c. What is the $P(3 < X \leq 5)$?

d. What is the $P(X > 2)$?

e. What is the $P(2 \leq X \leq 5)$?

Example 3: A coin is tossed twice. Let the random variable X denote the number of tails that occur in the two tosses. Find the probability distribution for X and then draw the histogram corresponding to the probability distribution of X.