

Section 5.2 Frequency and Probability Distributions

Math 141

Main ideas

Distribution: possible outcomes.

Frequency distribution: *how many times* each outcome **did** occur.

Relative frequency distribution: what *fraction* of the time each outcome **did** occur.

Probability distribution (“expected relative frequency distribution”): what *fraction* of the time each outcome **should** occur.

In histograms, area = probability.

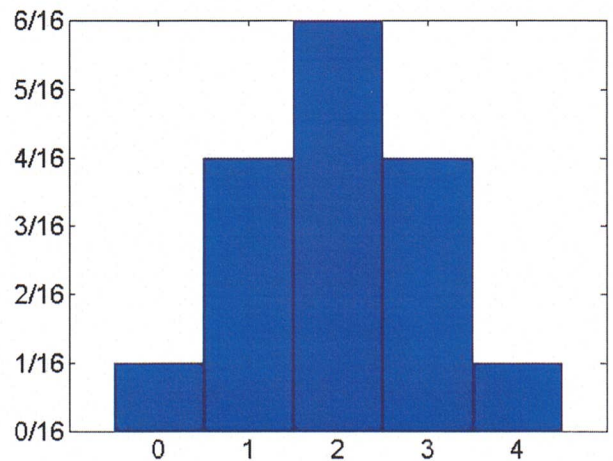
Random variables.

Problems

1. Probability distribution.

Flip 4 coins. Total number of possible outcomes =

Outcome (number of heads)	Number of ways it can occur	Probability
0	$C(4, 0) = 1$	$1/16 = .0625$
1	$C(4, 1) = 4$	$4/16 = .2500$
2	$C(4, 2) = 6$	$6/16 = .3750$
3	$C(4, 3) = 4$	$4/16 = .2500$
4	$C(4, 4) = 1$	$1/16 = .0625$
Total	16	$16/16 = 1.0000$



2. Frequency distribution, relative frequency distribution, probability distribution.

Flip 4 coins. Record the number of heads for each flip.

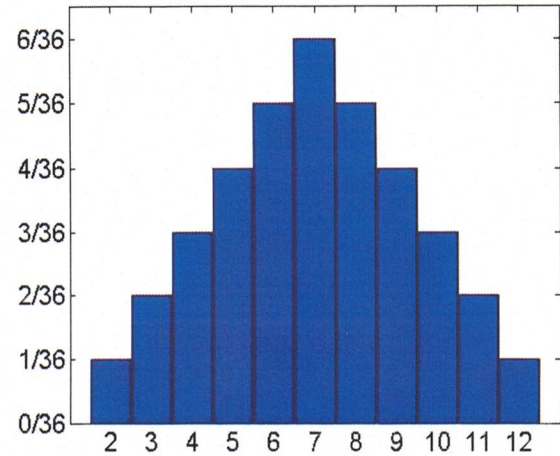
Outcome (number of heads)	Frequency	Relative frequency	Expected relative frequency (probability)
0	9	$9/111 = .0811$.0625
1	23	$23/111 = .2072$.2500
2	37	$37/111 = .3333$.3750
3	32	$32/111 = .2883$.2500
4	10	$10/111 = .0901$.0625
Total	111	$111/111 = 1.0000$	1.0000

3. Frequency distribution, relatively frequency distribution, probability distribution.

Roll two dice. Record the sum of each roll.

From a previous semester of this class.

Sum	# of outcomes	Fraction of all outcomes	Expected fraction
2	15	$15/926 = .0162$	$1/36 = .0278$
3	73	$73/926 = .0788$	$2/36 = .0556$
4	69	$69/926 = .0745$	$3/36 = .0833$
5	94	$94/926 = .1015$	$4/36 = .1111$
6	130	$130/926 = .1404$	$5/36 = .1389$
7	150	$150/926 = .1620$	$6/36 = .1667$
8	125	$125/926 = .1350$	$5/36 = .1389$
9	110	$110/926 = .1188$	$4/36 = .1111$
10	80	$80/926 = .0864$	$3/36 = .0833$
11	55	$55/926 = .0594$	$2/36 = .0556$
12	25	$25/926 = .0270$	$1/36 = .0278$
Total	926	1.0000	1.0000



4. Random variable X is the thing we are interested in for an experiment.

Experiment: flip four coins.
Let X = the number of heads.

k	Pr(X = k)
0	$1/16$
1	$4/16$
2	$6/16$
3	$4/16$
4	$1/16$

Experiment: roll two dice.
Let X = the sum of dice.

k	Pr(X = k)
2	$1/36$
3	$2/36$
4	$3/36$
⋮	⋮
12	$1/36$

5. Suppose there is some experiment with the following outcomes of -1, 0, 1 or 2.

k	Pr(X = k)
-1	.2
0	.3
1	.4
2	.1

k	Pr(X ² = k)
0	.3
1	.6
4	.1

k	Pr(X ² +2 = k)
2	.3
3	.6
6	.1