

## Review 6A

Math 210

1. Suppose a die is thrown until a 6 occurs. Let the random variable  $X$  denote the number of tosses.
  - (a) What values does  $X$  take on.
  - (b) Give the probability distribution for the random variable  $X$ .
2. \$100,000 flight insurance is sold at an airport for \$5. If the probability of a fatal accident for an individual is .00000127, what is the expected return of the purchase of flight insurance?
3. An elementary school library finds that the number of books checked out each week by a fifth grade student has the following probability distribution.

$x$	$P(X = x)$
0	0.13
1	0.05
2	0.15
3	0.07
4	0.22
5	0.28
6	0.10

Find the expected number of books a randomly picked fifth grader will check out each week. What is the variance and standard deviation of this distribution?

4. A card is randomly selected from a deck of cards, examined to see if it is a ace and then returned to the deck. This is done four times.
  - (a) Find the probability of drawing exactly 0, 1, 2, 3, 4 spades.
  - (b) Construct the binomial distribution and draw the histogram associated with this.
  - (c) What is the expected number of spades for four draws? Compute the standard deviation of the random variable associated with this.
5. Suppose  $X$  is a normal random variable with  $\mu = 500$  and  $\sigma = 200$ . Find the value of:
  - (a)  $P(X < 0)$
  - (b)  $P(X > 600)$
  - (c)  $P(450 < X < 550)$
6. Suppose diameters of pinto bean are normally distributed with a mean of  $\mu = 7.5$  mm and have a standard deviation of  $\sigma = .4$  mm. What is the probability of a bean having a diameter of 8.0 mm or larger?
7. Suppose a die is thrown 100 times. What is the probability of obtaining 20 or more ones?

Answers to problems on the other side: 1. (a) {HHH, HHT, HTH, THH, TTH, THT, HTT, TTT}, (b) {0, 1, 2, 3}, (c) 

$x$	0	1	2
$P(X = x)$	.125	.375	.375

2. 50¢ 3.  $E(X) = 2.1$ ,  $\text{Var}(X) = 1.59$ ,  $\sigma = 1.26$  4. (a)  $P(X = 0) = \frac{243}{1024}$ ,  $P(X = 1) = \frac{405}{1024}$ ,  $P(X = 2) = \frac{135}{512}$ ,  $P(X = 3) = \frac{45}{512}$ ,  $P(X = 4) = \frac{15}{1024}$ ,  $P(X = 5) = \frac{1}{1024}$ , (b) 

$x$	0	1	2	3	4	5
$P(X = x)$	.2373	.3955	.2637	.0879	.0146	.0010

, (c)  $\mu = 1.25$ ,  $\sigma = .9682$  5. (a) .0228, (b)  $\approx .7486$  (c)  $\approx .2586$  6. 89.38% 7. .0013

## Review 6B

Math 210

1. Suppose three coins are tossed. Let the random variable  $X$  denote the number of heads that occur.
  - (a) List the outcomes of this experiment.
  - (b) What values does  $X$  take on.
  - (c) Give the probability distribution for the random variable  $X$ .
2. 500 tickets are sold for a dollar each in a drawing to give away a \$200 television set. Five consolation prizes of \$10 gift certificates will also be given out. What is the expected return on the purchase of one ticket?
3. The number of freighters entering A Harbor between between 8am and 2pm on Fridays is given by the following probability distribution.

$x$	$P(X = x)$
0	0.10
1	0.20
2	0.40
3	0.15
4	0.10
5	0.05

Find the expected number of freighters entering the harbor during these hours. What is the variance and standard deviation of this distribution?

4. Two coins are tossed and the toss is judged a winning toss only if no tails occur. This is repeated five times.
  - (a) Find the probability of obtain exactly 0, 1, 2, 3, 4, 5 winning tosses.
  - (b) Construct the binomial distribution and draw the histogram associated with this.
  - (c) Compute the mean and the standard deviation of the random variable associated with this.
5. Suppose  $X$  is a normal random variable with  $\mu = 60$  and  $\sigma = 15$ . Find the value of:
  - (a)  $P(X < 30)$
  - (b)  $P(X > 50)$
  - (c)  $P(55 < X < 65)$
6. Suppose weights of men are approximately normally distributed with a mean of 163 pounds and and standard deviation of 28 pounds. If the minimum and maximum weights in order to be a volunteer fireman are 128 and 254, what proportion of the men meet this qualification?
7. Suppose a coin is flipped 100 times. What is the probability of obtaining 65 or more heads?

Answers to problems on the other side: 1. (a)  $\{1, 2, 3, \dots\}$ , (b) 

$x$	1	2	3	4	$\dots$
$P(X = x)$	$1/6$	$5/36$	$25/216$	$125/1296$	$\dots$

; 2.  $13¢$  3.  $E(X) = 3.44$ ,  $\text{Var}(X) = 3.5664$ ,  $\sigma = 1.8884$  4. (a)  $P(X = 0) = \frac{20736}{28561}$ ,  $P(X = 1) = \frac{6912}{28561}$ ,  $P(X = 2) = \frac{864}{28561}$ ,  $P(X = 3) = \frac{48}{28561}$ ,  $P(X = 4) = \frac{1}{28561}$ , 5. ( b) 

$x$	0	1	2	3	4
$P(X = x)$	.7260	.2420	.0303	.0117	.0000

, (c)  $\mu = 0.3077$ ,  $\sigma = .5329$  6. (a) .0062, (b) .3085 (c) .1974 7. .1056 8. 40.52%