4. b.

	X	P(X=x)	X·P(X=x)
win	130	4/100	5.2
lose	-20	96/100	-19.2
			μ = -14

X = profit

2.

X	P(X=x)	X·P(X=x)
10	1/6	1.67
5	2/6	1.67
-6	3/6	-3
		μ = 0.34

3.

X = profit

investment $

x	P(X=x)	X·P(X=x)
5,000,000	0.10	500,000
1,000,000	0.30	300,000
-1,000,000	0.60	-600,000
		μ = 200,000

X = variable

x = specific value

$P(X = 5{,}000{,}000) = 0.10$

Binomial Probability Distribution

example: Toss a coin 5 times & let X stand for the number of tails

Binomial experiment:

1. Fixed number of trials, denoted by n. n = 5
2. Trials are independent.
3. Two possible outcomes for each trial (heads/tails)
   success/failure success = tails, failure = heads
4. The probability of success (p) and the probability of failure (q) must remain constant.

Binomial probability formula: $P(X = x) = \frac{n!}{x!(n-x)!} p^x q^{n-x}$

X = # of tails in 5 tosses

X	P(X=x)	cumulative probabilities
0	0.03125	0.03125
1	0.15625	0.1875
2	0.3125	0.5
3	0.3125	0.8125

$P(X=0) = \frac{5!}{0!(5-0)!}(.5)^0(.5)^{5-0}$

$P(X=1) = \frac{5!}{1!(5-1)!}(.5)^1(.5)^{5-1}$

4	0.15625	0.96875	$P(X=2) = \frac{5!}{2!(5-2)!}(.5)^2(.5)^{5-2}$
5	0.03125	1	

```
1.67+1.67-3
                .34
5!
               120
5!/(0!*5!)*.5^0*
.5^5
             .03125
```

binompdf(n, p) ← This will give you the probabilities associated with each value of X.

What is the probability that you flip a coin 5 times and get 3 tails? 0.3125 binompdf(n, p, x) 5, .5, 3

What is the probability that you flip a coin 5 times and get 2 or fewer tails? binomcdf(5, .5, 2)

$0.03125 + 0.15625 + 0.3125 = 0.5$

example: Suppose 30% of Credit card users pay their bills in full each month. If we select 5 credit card holders at random, what the probability that exactly one pays his/her bills every month?

success = paying bills in full

$n = 5$

$p = 0.30$

$q = 0.70$

$x = 1$

binompdf(n, p, x) = binompdf(5, 0.30, 1)

$= 0.36015$

$$P(X=1) = \frac{5!}{1!(5-1)!}(0.30)^1(0.70)^{5-1}$$

What is the probability that 4 or fewer pay their bills in full every month.

$X = 0, 1, 2, 3, 4$

$P(X \leq 4) = \text{binomcdf}(5, 0.30, 4)$

sums the probabilities from $X=0$ to $X=4$

$= 0.99757$

What is the probability that three or more pay their bills in full every month?

$P(X \geq 3) = 1 - P(X \leq 2) = 1 - \text{binomcdf}(5, .3, 2)$

complement

$X = 3, 4, \text{or } 5$ $X = 0, 1, 2$ $= 0.16308$

Homework: Chapter 4: 7, 8, 9, 10, 11, 12, 13 skipd

↑ wording