

Problems for You to Do: (Sec. 4.1 – 4.2)

1. In the “Straight & Scramble” version of the BC Lottery Corporation Daily 3 game the probability distribution of your winnings for each \$1 played is given as

Winnings	\$290	\$40	\$0
Probability	$\frac{1}{1000}$	$\frac{1}{200}$	

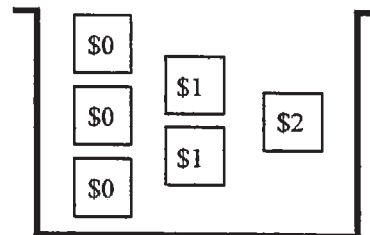
- What is the probability that you win \$0?
- What is your expected winnings for each \$1 played?
- What is the standard deviation of your winnings for each \$1 played?

Note: For (b), (c), give answer to 2 decimals; state units where appropriate.

2. Experiment: randomly select 2 bills from the pot (without replacement).

Random Variable: X = total \$ value of the 2 bills.

Find the probability distribution of X (express the probabilities as common fractions *not* decimals). Display the distribution as a table and as a graph.



- A box contains four cards numbered 1 through 4. Two cards are drawn without replacement.
 - List the 12 equally likely simple outcomes of the experiment.
 - Let X represent the sum of the two cards. Give the probability distribution of X in both table and graph form, properly labelled.
 - Find the mean and standard deviation of the distribution. Identify each with the appropriate symbol.
- A box contains 4 red chips and 8 black chips. Two chips are randomly drawn without replacement. Find the distribution of the number of red chips that occur in the two draws and present it in tabular form.
- The distribution of the number of moves to date made by people who reside in a home of their choice is given by:

Number of moves	0	1	2	3	4
Probability	.70	.20	.04	.03	.03

- Find the expected number of moves made by the people.
- Find the standard deviation of the number of moves made by the people.



DAILY 3 is a B.C.-only lottery featuring three ways to play—Straight, Scramble and Straight & Scramble. Playing DAILY 3 is as easy as 1, 2, 3!

PRICE:

• \$1, \$2, \$5 or \$10

DRAWS HELD:

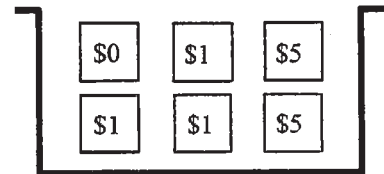
- daily
- you can buy tickets up to 9 p.m. Pacific time for that day's draw

6. In a version of the B.C. Lottery Club Keno game, the probability distribution of your winnings for each \$1 played is given by

Winnings	\$20	\$2	\$0
Probability	$\frac{1}{73}$	$\frac{1}{8}$	

- a) What is the probability of winning \$0? (Give your answer as an "exact" common fraction, not a decimal!)
- b) What is your expected winnings for each \$1 played?

7. a) Experiment: Select 2 bills at random from the pot
without replacement.
Random variable: Let X = Total \$ value of the two bills.



Find the probability distribution of X . Present it both in table form and as a graph.

- b) If in the above experiment the 2 bills were selected randomly **with replacement**, would the *values* of X change? Explain! (There is no need to calculate the probabilities here!)
8. a) The following table represents a probability distribution for a random variable X . Complete the table.

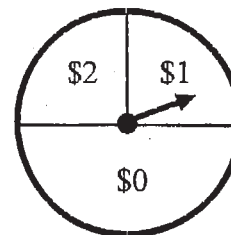
x	$P(x)$
0	0.15
1	0
2	0.35
3	

- b) For this distribution, determine the mean and standard deviation.
9. A box contains four discs numbered as follows: 2, 4, 6, 8. Two discs are drawn in succession without replacement.
- a) List the 12 equally likely simple events of the sample space.
- b) Let X represent the average of the two numbers drawn. Give the distribution of X .
10. A game of chance involves drawing *one card* from a regular deck of 52:
- If you draw the Ace of Spades you win \$100.
 - If you draw any other Ace you win \$10.
 - If you draw a Jack, Queen or King you win \$2.
 - If you draw any other card, you lose \$5.

Let X = the net winnings (in \$) when playing the game once.

- a) Find the probability distribution of X , and present it in a properly labelled table.
- b) Is this a "good game" for you to play? Justify your answer.

11. Experiment: spin the pointer *twice*.
Random Variable: X = total \$ value of two spins.



Find the probability distribution of X and display it as a table and as a graph.

12. The probability distribution for the number of major defects for a randomly selected new car of a certain type is given by

Number of Defects	Probability
0	.15
1	.35
2	.30
3	.15
4	.05

For this probability distribution find

- a) mean number of defects per car
b) standard deviation of the number of defects per car
13. The number of warranty claims for a randomly selected T.V. of a particular brand is a random variable with probability distribution as follows:

No. of Claims	0	1	2	3	4
Probability	0.35	0.40	0.15	0.05	0.05

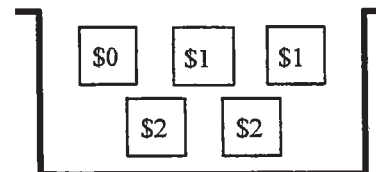
- a) What is the probability that a randomly selected T.V. will have at least two warranty claims?
b) What is the mean number of warranty claims?
c) What is the standard deviation of the number of warranty claims?
14. For a casino game the distribution of your possible winnings for each play of the game is given in the table to the right. What is the *exact probability* (a common fraction, not a decimal) that you win \$5?

Winnings	\$0	\$2	\$5
Probability	$\frac{4}{7}$	$\frac{1}{5}$?

15. a) Experiment: randomly select 2 bills from the pot **without replacement**.

Random Variable: X = the **total** \$ value of the 2 bills.

Find the probability distribution of X and display it as a table and as a graph.



- b) If the 2 bills in Question 2 were randomly selected **with replacement** would the *values* of X be the same? Explain. (You do *not* need to calculate probabilities.)



16. What are your expected winnings for each \$1 bet on the "EXTRA"? ("Hey, you never know".)

Say "YES" to a chance at half a million dollars with EXTRA, the B.C.-only lottery played in conjunction with BC/49 and 6/49. Four numbers from 1 - 99 are randomly generated and automatically printed on all BC/49 and 6/49 tickets.

Round your answer to 2 decimals.

PRIZES		
Match	Win	Chances to win (per \$1 played)
4/4	\$500,000	1:3,764,376
3/4	\$1,000	1:9,986
2/4	\$10	1:141
1/4	\$1	1:6.8

↑
Probabilities, not odds

17. The table below gives the probability distribution for the number of passengers per vehicle arriving at the college.

No. of passengers	0	1	2	3	4
Probability	.35	.25	.2	.15	.05

- a) What is the probability that a vehicle has at least 2 passengers?
 b) What is the expected (mean) number of passengers per vehicle?
 c) What is the standard deviation of the number of passengers per vehicle?
18. Does $p(x) = \frac{x}{4}$, where $x = 0, 1, 2, 3$, determine a probability distribution or not? Support your answer.
19. In a casino, if you bet on the number 7 in roulette, you have a $\frac{1}{38}$ probability of *winning* \$175, otherwise you *lose* \$5. What is the expected value of your net winnings?
20. Employees in a large company have been put into groups of 4 for the company's annual golf tournament. For a randomly selected group of 4, the number of women in the group is a random variable with the distribution as (partially) shown:

- a) What is the probability that there are 4 women in a randomly chosen group? Express your answer as a *common fraction* (i.e., non-decimal).

x	0	1	2	3	4
$p(x)$	$\frac{42}{125}$	$\frac{118}{250}$	$\frac{1}{10}$	$\frac{1}{25}$?

- b) What is the expected value of the number of women in a group?

21. A batch of 10 switches contains 2 defective switches. Quality control takes a random sample of 2 switches from the batch.

Let X = the number of defective switches in the sample.

- a) Find the probability distribution for X , and express it in both tabular and graphical forms (properly labelled).
- b) Find the mean, variance and standard deviation of X , and identify them with appropriate notation.