

1.(1 pt) Determine whether the following are valid probability distributions or not. Type "VALID" if it is valid, or type "INVALID" if it is not a valid probability distributions.

(a)

$x$	1	2	4	7
$P(x)$	0.3	0.2	0.2	0.3

answer: \_\_\_\_\_

(b)

$P(x) = \frac{1}{5x}$ , where  $x = 1, 2, 3, \dots$

answer: \_\_\_\_\_

(c)

$x$	1	2	4	7
$P(x)$	0.3	0.1	-0.2	0.8

answer: \_\_\_\_\_

2.(1 pt) The mean and standard deviation of a random variable  $x$  are 10 and 2 respectively. Find the mean and standard deviation of the given random variables:

(1)  $y = x + 6$

$\mu =$  \_\_\_\_\_

$\sigma =$  \_\_\_\_\_

(2)  $v = 3x$

$\mu =$  \_\_\_\_\_

$\sigma =$  \_\_\_\_\_

(3)  $w = 3x + 6$

$\mu =$  \_\_\_\_\_

$\sigma =$  \_\_\_\_\_

3.(1 pt)

$x$	19	20	21	22	23
$P(x)$	0.1	0.2	0.1	0.1	0.5

Given the discrete probability distribution above, determine the following:

(a)  $P(x \leq 22) =$  \_\_\_\_\_

(b)  $P(x = 19) =$  \_\_\_\_\_

(c)  $P(x \geq 22 \text{ or } x < 20) =$  \_\_\_\_\_

4.(1 pt) Three dice are rolled. Let the random variable  $x$  represent the sum of the 3 dice. By assuming that each of the  $6^3$  possible outcomes is equally likely, find the probability that  $x$  equals 10.

$P(x = 10) =$  \_\_\_\_\_

5.(1 pt) Let  $x$  represent the difference between the number of heads and the number of tails when a coin is tossed 43 times. Then

$P(x = 7) =$  \_\_\_\_\_

6.(1 pt) Four buses carrying 165 high school students arrive to Montreal. The buses carry, respectively, 39, 49, 31, and 46 students. One of the students is randomly selected. Let  $X$  denote the number of students that were on the bus carrying this

randomly selected student. One of the 4 bus drivers is also randomly selected. Let  $Y$  denote the number of students on his bus. Compute the expectations of  $X$  and  $Y$ :

$E(X) =$  \_\_\_\_\_

$E(Y) =$  \_\_\_\_\_

7.(1 pt) Four buses carrying 149 high school students arrive to Montreal. The buses carry, respectively, 32, 49, 30, and 38 students. One of the students is randomly selected. Let  $X$  denote the number of students that were on the bus carrying this randomly selected student. One of the 4 bus drivers is also randomly selected. Let  $Y$  denote the number of students on his bus. Compute the expectations and variances of  $X$  and  $Y$ :

$E(X) =$  \_\_\_\_\_

$\text{Var}(X) =$  \_\_\_\_\_

$E(Y) =$  \_\_\_\_\_

$\text{Var}(Y) =$  \_\_\_\_\_

8.(1 pt) Two fair dice are rolled 5 times. Let the random variable  $x$  represent the number of times that the sum 10 occurs. The table below describes the probability distribution. Find the value of the missing probability.

$x$	$P(x)$
0	0.64722784850823
1	_____
2	0.0534899048353909
3	0.00486271862139918
4	0.000221032664609053
5	4.01877572016461e-06

Would it be unusual to roll a pair of dice 5 times and get no 10s?

(enter YES or NO) \_\_\_\_\_

9.(1 pt) A rock concert producer has scheduled an outdoor concert. The producer estimates the attendance will depend on the weather according to the following table.

Weather	Attendance	Probability
wet, cold	5000	0.1
wet, warm	25000	0.3
dry, cold	20000	0.2
dry, warm	60000	0.4

(a) What is the expected attendance?

answer: \_\_\_\_\_

(b) If tickets cost \$ 30 each, the band will cost \$ 250000, plus \$ 60000 for administration. What is the expected profit?

answer: \_\_\_\_\_

10.(1 pt) Prizes and the chances of winning in a sweepstakes are given in the table below.

Prize	Chances
\$25,000,000	1 chance in 400,000,000
\$250,000	1 chance in 200,000,000
\$50,000	1 chance in 70,000,000
\$15,000	1 chance in 3,000,000
\$200,000	1 chance in 800,000
A watch valued at \$65	1 chance in 4,000

(a) Find the expected value (in dollars) of the amount won by one entry.

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(b) Find the expected value (in dollars) if the cost of entering this sweepstakes is the cost of a postage stamp (34 cents)

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