CENGAGE | WEBASSIGN

EN

readly@oregonstate.edu
(sign out)

Home My Assignments Grades
Communication Calendar
My eBooks

ST 314, section 002 (New), Fall 2020

ST314 WA Homework #1 (Homework)

INSTRUCTOR
Molyneux James
Oregon State University

Current Score

QUESTION	1	2	3	4	5	6	7	8	9	10
POINTS	1/1	1/1	1/1	3/3	2/2	4/4	2/2	3/3	2/2	1/1

TOTAL SCORE

20/20 100.0%

Due Date

WED, OCT 7, 2020
11:59 PM PDT

Request Extension

Assignment Submission & Scoring

Assignment Submission

For this assignment, you submit answers by questions.

Assignment Scoring

Your best submission for each question part is used for your score.

1. **[1/1 Points]** DETAILS 1/4 Submissions Used MY NOTES ASK YOUR TEACHER

Fill in the blank.
The set of all possible outcomes in an experiment is describe by the sample space ✓ .
The intersection ✓ of two events A and B is the event in which both A and B occur.
Two events are said to be mutually exclusive ✓ if they can not occur at the same time.
The union ✓ of two events A and B is the event in which either A or B or both occur.
Two events are said to be independent ✓ if the occurrence of one does not influence the probability of occurrence for the other.

Show My Work (Optional)

2. **[1/1 Points]** DETAILS 2/4 Submissions Used MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

In a class of 125 students, 30 are computer science majors, 49 are mechanical engineering majors, 13 are civil engineers and the rest are general engineering majors. Assume students only have one major.
If a student is chosen at random what is the probability they are:
Round your answers to 3 decimal places.
a civil engineering major? 0.104 ✓
a civil engineering major or mechanical engineering major? 0.496 ✓
a general engineering major? 0.264 ✓
not a computer science major? 0.76 ✓
Suppose six students from the class are chosen at random what is the probability none are mechanical engineering majors? 0.047 ✓

Show My Work (Optional)

3. **[1/1 Points]** DETAILS 1/4 Submissions Used MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

Suppose that 65% of all adults regularly consume coffee, 55% regularly consume carbonated soda, and 50% regularly consumes both coffee and soda.

(a) What is the chance a randomly selected adult regularly drinks coffee but doesn't drink soda?
.15 ✓

(b) What is the probability that a randomly selected adult consumes coffee, soda or both?
.7 ✓

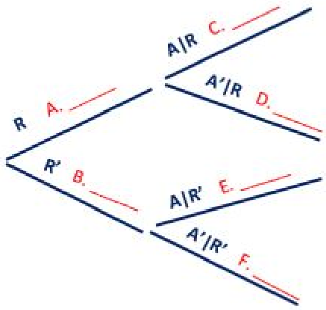
(c) What is the probability that a randomly selected adult doesn't regularly consume at least one of these two products?
.3 ✓

Show My Work (Optional)

4. **[3/3 Points]** DETAILS 2/4 Submissions Used MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

A professor has noticed that students that attend class regularly, miss no more than two classes per term, generally get better grades. For the class, the overall percent of students who attend regularly is 78%. Of those who come to class on a regular basis, 51% receive A's. Of those who don't attend regularly, only 4% get A's.

Draw a tree diagram like the one in the image, where R = "attends class regularly", R' = "does not attend class regularly", A = "earned an A", A' = "did not earn



an A".

(a) Based on your tree diagram fill in the appropriate matching probabilities, enter your answer as a proportion with three decimal places.:

A. or P(R) = .78
B. or P(R') = .22
C. or P(A|R) = .51
D. or P(A'|R) = .49
E. or P(A|R') = .04
F. or P(A'|R') = .96

(b)Among *all* students what proportion earn an A **and** don't attend class regularly? .009
(c)What is the chance a randomly chosen student will earn an A in the class? .407 *Hint: Use the total law of probability.*
(d)Given a student earned an A, what is the chance they attend class regularly? .978 *Hint: P(R|A)*

Show My Work (Optional)

What steps or reasoning did you use? Your work may add bonus points towards your score.

(.78*.51)/((.78*.51)+(0.22*0.04))

Uploaded File (10 file maximum)

- No Files to Display

Upload File

Show My Work has not been graded yet.

Uploaded File (10 file maximum)

- No Files to Display

5. **[2/2 Points]** DETAILS 1/4 Submissions Used MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

The following is the probability mass function for the number of times a certain computer program will malfunction:

x	0	1	2	3	4	5
$p(x)$	0.05	0.29	0.37	0.16	0.1	0.03

(a) What is the probability that the computer program will malfunction more than 3 times?

.13

(b) Compute $E(X)$, $E(X^2)$, and $V(X)$.

$E(X) =$ 2.06

$E(X^2) =$ 5.56

$V(X) =$ 1.316

(c) Suppose Y, the time in minutes to fix malfunctions, relates to the number of times the program malfunctions, by the function: Y = 9*X . What is the expected time in minutes needed to fix malfunctions in the program?

18.54 Minutes

(d) What is the variance of the time in minutes to fix the malfunctions?

106.628 Minutes^2

Show My Work (Optional)

What steps or reasoning did you use? Your work may add bonus points towards your score.

E(X) = SUM(x * p(x))
E(X^2) = SUM(x^2 * p(x))
V(X) = E(X^2)-(E(X))^2

E(W) = a * E(X) + b | a, b come from y=ax+b equation provided.
V(W) = a^2 * V(X)

Uploaded File (10 file maximum)

- No Files to Display

Upload File

Show My Work has not been graded yet.

Uploaded File (10 file maximum)

- No Files to Display

6. **[4/4 Points]** DETAILS 1/4 Submissions Used MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

A consumer organization that evaluates new motorcycles customarily reports the number of major defects in each motorcycle examined. Let *X* denote the number of major defects in a randomly selected motorcycle of a certain type.

Recall the *cumulative density function*, or "cdf", is a function for x that calculates the probability of the value x and all values below, F(x) = P(X≤x) .

The cdf of *X* is as follows:

x	0	1	2	3	4	5	6
F(x)	0.06	0.25	0.35	0.67	0.92	0.97	1

Calculate the following probabilities directly from the cdf: (Round to two decimal places.)

(a) *F*(2), that is, *P*(*X* ≤ 2)
.35 ✓

(b) *P*(*X* > 3)
0.33 ✓

(c) *P*(2 ≤ *X* ≤ 5)
0.72 ✓

(d) *P*(2 < *X* < 5)
0.57 ✓

(e) What is the probability mass function, P(X = x), for X? (Round to two decimal places.)

x	0	1	2	3	4	5	6
p(x)	0.06 ✓	0.19 ✓	0.1 ✓	0.32 ✓	.25 ✓	.05 ✓	.03 ✓

(f) The mean and standard deviation for X are: (Round to two decimal places.)

The average number of defects is, E(X) = 2.78 ✓ .
The number of defects deviate from the average by, SD(X)= 1.439 ✓ .

Show My Work (Optional)

What steps or reasoning did you use? Your work may add bonus points towards your score.

SD(X) = SQRT(V(X))

For next problem (SMW broken there)

> dbinom(5, 6, .75)
[1] 0.355957
> pbinom(5, 6, .75)
[1] 0.8220215
> 1-(pbinom(4, 6, 0.75))
[1] 0.5339355

Uploaded File (10 file maximum)

- No Files to Display

Upload File

Show My Work has not been graded yet.

Uploaded File (10 file maximum)

- No Files to Display

---

7. **[2/2 Points]** DETAILS 1/4 Submissions Used MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

Suppose 75% of all students taking a beginning programming course fail to get their first program to run on first submission. Consider a group of 6 such students,where each student's success is independent from the other and the chance each student fails on their first try is consistent. (Round answers to three decimal places.)

(a) If X is the number of students whose program fails on the first run, then X comes from a binomial distribution with:
n = 6 ✓
p = .75 ✓ .

The binomial probability mass function is: P(X = x) = (n__x)^()p^x(1-p)**(n-x).
Use this function to calculate probabilities. You may verify the outcome of the function using the R command dbinom(x,n,p).

(b) What is the probability exactly 5 fail on their first submissions? .356 ✓
(c) What is the probability 5 or less fail on their first submissions? .822 ✓ *Hint: Find the $P(X \leq x)$ in R using pbinom(x,n,p).*
(d) What is the probability at least 5 fail on their first submissions? .534 ✓
(e) How many students should be expected to fail? μ_x= 4.5 ✓
(f) What is the standard deviation? σ_x = 1.061 ✓

Show My Work (Optional)

What steps or reasoning did you use? Your work may add bonus points towards your score.

Uploaded File (10 file maximum)

- No Files to Display

Upload File

Show My Work has not been graded yet.

Uploaded File (10 file maximum)

- No Files to Display

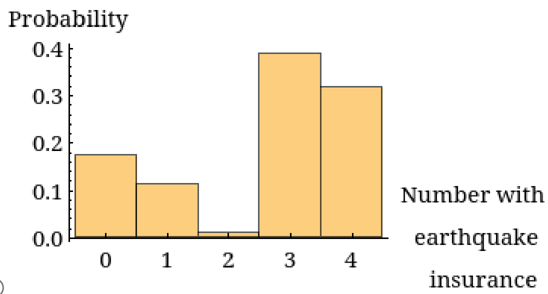
8. **[3/3 Points]** DETAILS 1/4 Submissions Used MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

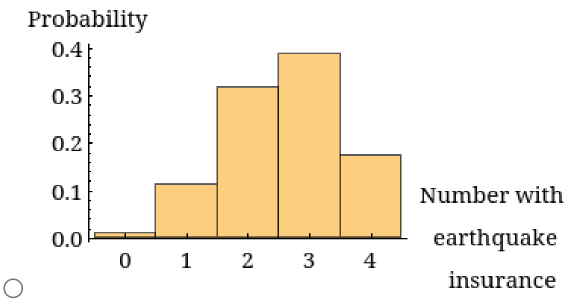
Some parts of California are particularly earthquake-prone. Suppose that in one metropolitan area, the chance a homeowner is insured against an earthquake is 0.35. A sample of four homeowners are to be selected at random. Suppose X is a random variable that is modeled by a binomial distribution which describes the number of homeowners out of the four that have earthquake insurance.

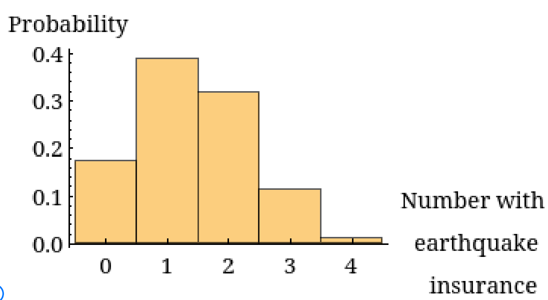
(a) Find the probability mass function of X. (Round your answers to four decimal places.)

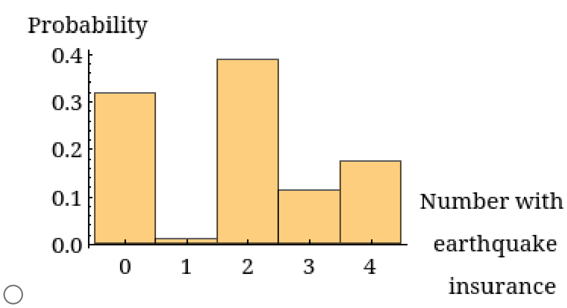
x	0	1	2	3	4
$p(x)$	0.1785	0.3845	.3105	.1115	0.0150

(b) Which of the following is a graph of the probability mass function (pmf)?

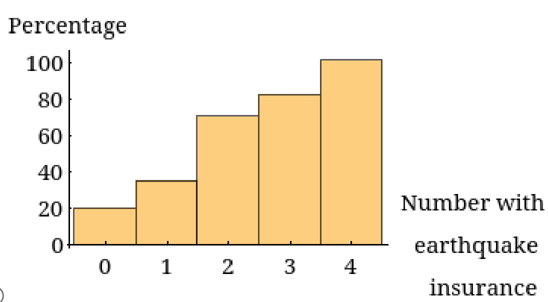


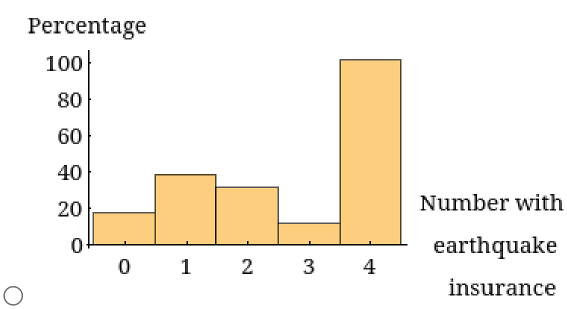


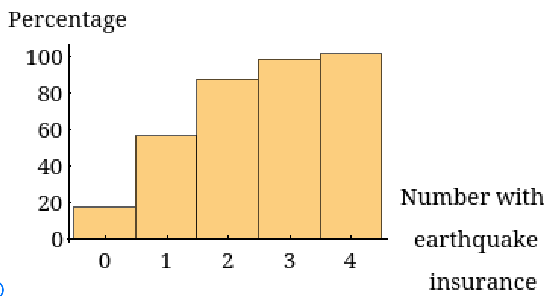


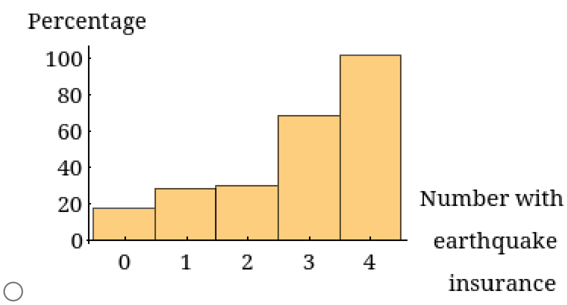


(c) Which of the following is a graph of the cumulative distribution function (cdf)?









(d) What is the most likely value for *X*?

1 ✓

(e) What is the probability that at most 1 of the four selected have earthquake insurance? (Round your answer to four decimal places.)

0.5630 ✓

(f) What is the probability that at least two of the four selected have earthquake insurance? (Round your answer to four decimal places.)

0.4370 ✓

(g) What is the expected value and standard deviation of X? (Round your answer to two decimal places.)

E(X)= μ_x = 1.4 ✓

SD(X) = σ_x = 0.95 ✓

Show My Work (Optional)

What steps or reasoning did you use? Your work may add bonus points towards your score.

```
> dbinom(0, 4, 0.35)
[1] 0.1785063
> dbinom(1, 4, 0.35)
[1] 0.384475
> dbinom(2, 4, 0.35)
[1] 0.3105375
> dbinom(2, 4, 0.35)
[1] 0.3105375
> dbinom(3, 4, 0.35)
[1] 0.111475
> dbinom(4, 4, 0.35)
[1] 0.01500625
> bbinom(1, 4, 0.35)
Error in bbinom(1, 4, 0.35) : could not find function "bbinom"
> pbinom(1, 4, 0.35)
[1] 0.5629813
> 1-pbinom(1, 4, 0.35)
[1] 0.4370187
> 0.35*4
[1] 1.4
> 48.35*(1-.35)
[1] 31.4275
```

Uploaded File (10 file maximum)

- No Files to Display

Upload File

Show My Work has not been graded yet.

Uploaded File (10 file maximum)

- No Files to Display

9. **[2/2 Points]** DETAILS 2/4 Submissions Used MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

Let X be the number of material anomalies occurring in a particular region of an aircraft gas-turbine disk. A researcher proposes a Poisson distribution for X. Suppose that $\lambda = 6$.

The Poisson probability mass function is:
P(X=x) = (e^(-lambda)*lambda^x)/(x!) for x = 0,1,2,...
Use the pmf to calculate probabilities. Verify these values in R using dpois(x,lambda).

Compute the following probabilities: (Round your answers to three decimal places.)

(a) $P(X = 5) =$ .161 .
(b) $P(X \le 5) =$ .446 .
(c) $P(X < 5) =$ .285 .
(d) $P(X > 5) =$ .554 .
(e) $P(4 \le X \le 8) =$ .696 .

Show My Work (Optional)

What steps or reasoning did you use? Your work may add bonus points towards your score.

```
> dpois(5, 6)
[1] 0.1606231
> ppois(5, 6)
[1] 0.4456796
> ppois(4, 6)
[1] 0.2850565
> 1-ppois(5, 6)
[1] 0.5543204
> ppois(8, 6)-ppois(4,6)
[1] 0.562181
> ppois(8, 6)-ppois(3,6)
[1] 0.6960336
```

Uploaded File (10 file maximum)

- No Files to Display

Upload File

Show My Work has not been graded yet.

Uploaded File (10 file maximum)

- No Files to Display

10. **[1/1 Points]** DETAILS 1/4 Submissions Used MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

The number of people arriving for treatment at an emergency room can be modeled by a Poisson Distribution with a rate parameter of eight per hour.

(a) What is the probability that exactly two arrivals occur during a particular hour? (Round your answer to three decimal places.)

0.011 ✓

(b) What is the probability that at least two people arrive during a particular hour? (Round your answer to three decimal places.)

.997 ✓

(c) How many people do you expect to arrive during a 30-min period?

4 ✓ people

Show My Work (Optional)

What steps or reasoning did you use? Your work may add bonus points towards your score.

```
> dpois(2, 8)
[1] 0.0107348
> 1-ppois(1, 8)
[1] 0.9969808
```

Uploaded File (10 file maximum)

- No Files to Display

Upload File

Show My Work has not been graded yet.

Uploaded File (10 file maximum)

- No Files to Display

Submit Assignment Save Assignment Progress

Home My Assignments Request Extension