STAT 511 MIDTERM, SPRING 2019 (20 pt total)

Name: Section number:

PLEASE SHOW ALL YOUR WORK

1. (5 pt) A utility company offers a lifeline rate to any household whose electricity usage falls below 240 kWh during a particular month. Let A denote the event that a randomly selected household in a certain community does not exceed the lifeline usage during January, and let B be the analogous event for the month of July (A and B refer to the same household). Suppose P(A) = .8, P(B) = .7, and  Compute the following:
   1. (3pt) The probability that a randomly selected household in this community does not exceed the lifeline usage in at least one of the months of January and July.

**ANSWER:**

1. *P*(*A**B*) = *P*(*A*) + *P*(*B*) – *P*(*A**B*), so *P*(*A**B*) = *P*(*A*) + *P*(*B*) – *P*(*A**B*) = .8 + .7 - .9 = .6
   1. (2pt) The probability that the lifeline usage amount is exceeded in exactly one of the two months.
2. *P*(AB) – *P*(AB) = .9 - .6 = .3
3. (5pt) A business has six telephone lines. Let X denote the number of lines in use at a specified time. The probability mass function of X is as follows:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| X | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| p(x) | 0.05 | 0.1 | 0.3 | 0.3 | 0.1 | 0.1 | 0.05 |

What is the probability that:

1. (2pt) At most three lines are in use

This probability is 0.75

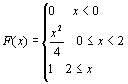
1. (2pt) Between two and four lines are in use

Inclusive of two and four, this is 0.70

1. (1pt) At least four lines are in use

This probability is 0.25

1. (10pt) The cdf of checkout duration X for a book on a 2-hour reserve at a college library is given by:



Use this cdf to compute the following:

a. (2pt) 

b. (3pt)

c. (2pt)

e. (3pt)

Answers:

a. 

b. 

c. 

e. 