ECE 341 - Homework #4

Binomial and Uniform Distributions. Summer 2023

Binomial Distribution

In D&D, a 5th-level fighter needs to roll a 14 or higher on a 20-sided die to save vs. spell (p = 7/20).

$$X(z) = \left(\frac{0.65z+0.35}{z} \right)$$

1) Determine the probability of making six saving throws in 10 rolls

2) Determine the probability distribution when rolling this die 10 times

NOAA has been keeping track of world weather for the past 142 years. 27 of last 30 years have been in the 30 hottest years on record.

3a) What is the probability of any given year being one of the 30 hottest on record (i.e. what is p?)

3b) What is the probability of 27 of the last 30 years being the hottest on record?

Uniform Distribution

4) The D&D spell *Insect Swarm* does 4-40 damage (the sum of rolling four 10-sided dice).

    Y = 4d10

Determine the

- pdf
- mean and standard deviation
- The probability of doing 30 or more damage with an *Insect Swarm* spell.

5) The D&D spell *Ice Storm* does 6-40 damage (the sum of four 6-sided dice and two 8-sided dice).

    Y = 4d6 + 2d8

Determine the

- pdf
- mean and standard deviation
- The probability of doing 30 or more damage with an *Ice Storm* spell

6) Assme you roll a 4, 6, 8, 10, and 12 sided die and take the sum

    Y = d4 + d6 + d8 + d10 + d12

Determine

- The pdf for Y
- The mean and standard deviation of Y, and
- The probability that the sum is 30 or more