ECE 341 - Homework #5

Geometric & Pascal Distributions. Summer 2023

Geometric Distributions

Let A be the number of times you roll an 8-sided die until you get a 1 (p = 1/8)

1) Determine the pdf of A using z-transforms. From this, compute

- The probabilty that A = 10
- The probability that A >= 10

2) Use a Monte-Carlo simulation with 100,000 A's. From your Monte-Carlo simulation, determine

- The probability that A = 10
- The probability that A >= 10

Pascal Distribution

Let

- A be the number of times you roll an 8-sided die until you get a 1 (p = 1/8), and
- B be the number of times you roll an 8-sided die until you get a 1 or 2 (p = 1/4).
- X = A + B

3) Determine the pdf of X using z-transforms. From this comptue

- The probability that X = 20
- The probability that X >= 20

4) Determine the pdf of X using convolution. From this, compute

- The probability that X = 20
- The probability that X >= 20

5) Use a Monte-Carlo simulation with 100,000 X's. From your Monte-Carlo simulation, determine

- The probability that X = 20
- The probability that X >= 20

(problem 6-8: over)

Pascal Distribution (cont'd)

Let

- A be the number of times you roll a 8-sided die until you roll a 1 (p = 1/8)
- B be the number of times you roll a 8-sided die until you get a 1 or 2 (p = 2/8)
- C be the number of times you roll a 8-sided die until you get a 1, 2, or 3 (p = 3/8)
- Y = A + B + C

6) Determine the pdf of Y using z-transforms. From this comptue

- The probability that Y = 20
- The probability that Y >= 20

7) Determine the pdf of Y using convolution. From this, compute

- The probability that Y = 20
- The probability that Y >= 20

8) Use a Monte-Carlo simulation with 100,000 Y's. From your Monte-Carlo simulation, determine

- The probability that Y = 20
- The probability that Y >= 20