ECE 341 - Homework #3

Dice Games and z-Transform

Yahtzee (5 dice)

In the game of Yahtzee, you roll five dice.

- You can then keep whichever dice you like and re-roll the rest.
- You can then do this a second time.

Whatever the results are after three rolls scores points. A Yahtzz is when you roll 5-of-a-kind.

1) Compute the odds of rolling five-of-a-kind when rolling 5 dice one time

dice = xxxxx

2) Compute the odds of rolling four-of-a-kind when rolling 5 dice one time

dice = xxxx y

3) (Conditional Probability): Compute the odds of getting a Yahtzz (5-of-a-kind) by

- Rolling 4-of-a-kind, then
- Rolling one die and getting a Yahtzee on the next roll, or
- Not getting a Yahtzee on the second roll but getting in on the 3rd roll

4) (Yahtzee program): Write a Matlab program to play Yahtzee.

- Assume you always go for a Yahtzee
- Up to two draw phases (three rolls total)
- Keep the largest pair (2 of a kind, 3-of a kind) and reroll the rest of the dice

5) With your program, do a Monte Carlo simlation for 100,000 rolls of the dice and determine the

- Odds of getting a Yahtzee on one roll, and
- Odds of getting a Yahtzee after 3 rolls.

6) Compute the odds of rolling 4-of-a-kind when rolling 5 dice

dice = xxxx y

(over for problems 7-9)

z-Transforms (over)

Find the inverse z-transform

7) $$X = \left(\frac{0.01}{(z-0.95)(z-0.9)(z-0.85)} \right)$$

8) $$X = \left(\frac{0.1(z+1)(z-1)}{(z-0.9)(z-0.8)(z-0.7)} \right)$$

9) A new Tesla Model Y costs $58,990. If you take out a 36-month loan at 2.34% interest, what is your monthly payment? Solve using z-transforms.