ECE 341 - Test #1

Combinations, Permitations, and Discrete Probability

Open-Book, Open Notes. Calculators, Matlab, Tarot cards, Internet allowed. Just not other people.

Please sign if possible (i.e. you did not get help from someone else).

No aid given, received, or observed: ________________________________

Due Sunday, May 31st, 8am

Please make the subject "ECE 341 HW#4" if submitting homework electronically to Jacob_Glower@yahoo.com (or on blackboard)

1. Combinationas and Permutations (dice)

In game of Farkle, you roll six dice to start the game. What is the probabilty of rolling 3-pair?

- note: 4 of a kind + pair counts as 3-pair
- dice = { xx yy zz,   xxxx yy }

2. Conditional Probability (cards)

Using conditional probability compute the odds of getting a full-house in 5-card draw.

- You are dealt a full house (xxx yy)
- You are dealt 3 of a kind (xxx yz), you discard the two cards that don't match, and get a full house
- You are dealt 2-pair (xx yy z), discard the off card, and get a full house,
- You are dealt a pair (xx abc), discard 3 then draw a full house, or
- You are dealt a high-card hand, discard 5, then draw a full house.

3. Binomial Distribution

Assume you are rolling a 6-sided die.

- If you roll a 1 or 2, you get 1 point ($p = 2/6$).
- If you roll a 3-6, you get zero points ($q = 4/6$).

3a) What is the probability of getting 7 or more points if you roll 10 dice?

3b) Assume the first three dice are all ones (3 points). Now what is the probabiityof getting 7 or more points when you roll 10 dice (total - including the 3 you already rolled).

4. Uniform Distribution

Let

- A be the result of rolling a 4-sided die { 1, 2, 3, 4}
- B be the result of rolling a 6-sided die { 1, 2, 3, 4, 5, 6 }
- C be the result of rolling a 10-sided die { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 }

4a) What is the pdf for the sum

$$Y = A + B + C$$

4b) What is the probability that the sum (Y) will be 16 or more?

4c) What is the resulting mean and variance of Y?

5. Geometric & Pascal Distribution

Let the moment generating function for F be

$$F(z) = \left(\frac{a(z-0.5)}{(z-0.9)(z-0.8)} \right)$$

5a) Determine 'a' so that this is a valid moment generating funciton, meaning (all equivalent)

- The total probabity is one
- The zeroth moment is 1.000
- $m_0 = F(z = 1) = 1$

5b) Determine the pdf of F (the inverse z-transform of F(z))

5c) Determine the cdf of F (the inverse z-transform of $\left(\left(\frac{z}{z-1} \right) F(z) \right)$