ECE 341 - Test #1

Combinations, Permitations, and Discrete Probability

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

Enumeration and Dice

test: do not post

Let

$$M = \left(\frac{\text{birth month+14}}{5} \right)$$ rounded down (for example, February results in M = (2+14)/5 = 3.2 = 3)

$$N = \left(\frac{\text{birth date + 30}}{10} \right)$$ rounded down (for example, the 14th results in N = (14+30)/10 = 4.4 = 4)

Assume you are rolling two dice:

- d1 = 1..M
- d2 = 1..N

Let Y be the difference betwen the two rolls

Determine through enumeration the probability that Y = {0..5}

M	N	p(Y=0)	p(Y=1)	p(Y=2)	p(Y=3)	p(Y=4)

Combinations and Permutations

test: do not post

Using combinations and permutations, calculate the odds of a full house (xxx yy) in 7-card stud poker

- You are dealt 7 cards
- One card value has three of a kind (xxx)
- Another card has two of a kind (yy)
- The other two cards could be anything except x (which would be 4 of a kind)

Binomial Distribution

test: do not post

Let

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Assume

- N-sided dice (rolls numbers 1..N)
- You roll 10 of these N-sided dice
- Y = the number of 1's and 2's on these ten dice.

What is the probability that Y = M?

M # successes	N N sided dice	p(y=M) M rolls or 1 or 2 on with 10 die rolls

Uniform Distribution and Convolution

test: do not post

Let

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$$N = \left(\frac{\text{birth date} + 30}{10} \right)$$ rounded down (for example, the 14th results in N = (14+30)/10 = 4.4 = 4)

Assume

- N-sided dice (rolls numbers 1..N)
- You roll M of these N-sided dice
- Y = the sum of all M dice

a) Determine the pdf for Y: the sum of all of the dice

b) Determine the probability that the sum is 7 or less.

M	N	p(y = x)	p(y <= 7)

Geometric & Pascal Distribution

test: do not post

Let

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$$N = \left(\frac{\text{birth date + 30}}{10} \right)$$ rounded down (for example, the 14th results in N = (14+30)/10 = 4.4 = 4)

Let

- d1 is an M-sided die (rolls numbers 1..M)
- d2 is an N-sided die (rolls the numbers 1..N)

Let Y be

- The number of times you have to roll d1 to get a 1 or 2, plus
- The number of times you have to roll d2 to get a 1.

Determine the explicit fumction for y(x) using z-transforms

- partial credit of you solve for the pdf of y(x) using a different method

M	N	p(y = x)