

Fall 2019 COT 3100 Section 2 Quiz #3

Name: _____

Lab Section: 18(R9) 19(R10) 20(R11) 21(T2) 22(T3) 23(T4) 24(T5)

1) (8 pts) How many permutations of the word "DISCRETESTRUCTURES" does NOT have any consecutive vowels? Please put a box around your final answer and use words to describe where all of your numbers come from.

2) (5 pts) The identity, $\sum_{i=0}^n \binom{n}{i} \binom{n}{n-i} = \binom{2n}{n}$, can be proved combinatorially. The right hand side is the way to choose n items out of $2n$ items. Another way we can count the same thing is to take our $2n$ objects and color n of them red and the other n blue. Then, we can think of choosing n objects total by taking some red objects and some blue objects. Using this hint, fully explain why the summation on the left hand side equals the number of ways to choose n objects out of $2n$ objects.

3) (12 pts) You are buying 20 Christmas cards for friends and relatives. The local greeting card shop has a discount sale on some cards. There are 5 different types of cards on sale, type A, type B, type C, type D and type E. You really like card A, so you are going to buy at least 3 of those. In addition, there are only 6 of type D in stock and 8 of type E in stock. Given these restrictions, how many different combinations of 20 Christmas cards could you buy?