

Discrete Mathematics (ES1030)
TUTORIAL 5

Q. 1	Attempt the following
1)	There are 18 mathematics majors and 325 computer science majors at a college. a) How many ways are there to pick two representatives so that one is mathematics major and the other is a computer science major? b) How many ways are there to pick one representative who is either a mathematics major or a computer science major?
2)	A multiple-choice test contains 10 questions. There are four possible answers for each question. a) How many ways can a student answer the questions on the test if the student answers every question? b) How many ways can a student answer the questions on the test if the student can leave answers blank?
3)	How many positive integers between 50 and 100 a) are divisible by 7? Which integers are these? b) are divisible by 11? Which integers are these? c) are divisible by both 7 and 11? Which integers are these?
4)	How many strings of three decimal digits a) do not contain the same digit three times? b) begin with an odd digit? c) have exactly two digits that are 4s?
5)	How many strings of four decimal digits a) do not contain the same digit twice? b) end with an even digit? c) have exactly three digits that are 9s?
6)	A committee is formed consisting of one representative from each of the 50 states in the United States, where the representative from a state is either the governor or one of the two senators from that state. How many ways are there to form this committee?
7)	How many license plates can be made using either two letters followed by four digits or two digits followed by four letters?
8)	How many strings of eight English letters are there a) if letters can be repeated? b) if no letter can be repeated? c) that start with X, if letters can be repeated? d) that start with X, if no letter can be repeated? e) that start and end with X, if letters can be repeated? f) that start with the letters BO (in that order), if letters can be repeated? g) that start and end with the letters BO (in that order), if letters can be repeated? h) that start or end with the letters BO (in that order), if letters can be repeated?
9)	In how many ways can a photographer at a wedding arrange six people in a row, including the bride and groom, if a) the bride must be next to the groom? b) the bride is not next to the groom? c) the bride is positioned somewhere to the left of the groom?
10)	Use a tree diagram to find the number of bit strings of length four with no three consecutive Os.
Q. 2	Attempt the following
1)	Let $S = \{1, 2, 3, 4, 5\}$. a) List all the 3-permutations of S. b) List all the 3-combinations of S.
	How many permutations of the letters ABCDEFG contain a) the string BCD? b) the string CFGA?

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	c) the strings BA and GF? e) the strings ABC and CDE?	d) the strings ABC and DE? f) the strings CBA or BED?
2)	How many possibilities are there for the win, place, and show (first, second, and third) positions in a horse race with 12 horses if all orders of finish are possible?	
3)	How many bit strings of length 10 contain a) exactly four Is? b) at most four Is? c) at least four Is? d) an equal number of Os and 1 s?	
4)	In how many ways can a set of five letters be selected from the English alphabet?	
5)	How many subsets with more than two elements does a set with 100 elements have?	
6)	A coin is flipped 10 times where each flip comes up either heads or tails. How many possible outcomes a) are there in total? b) contain exactly two heads? c) contain at most three tails? d) contain the same number of heads and tails?	
7)	How many permutations of the letters ABCDEFGH contain a) the string ED? b) the string CDE? c) the strings BA and FGH? d) the strings AB, DE, and GH? e) the strings CAB and BED? f) the strings BCA and ABF?	
8)	Suppose that a department contains 10 men and 15 women. How many ways are there to form a committee with six members if it must have the same number of men and women?	
9)	Suppose that a department contains 10 men and 15 women. How many ways are there to form a committee with six members if it must have more women than men?	
10)	There are 12 students in a class. In how many ways can the 12 students take 4 different tests if three students are to take each test?	
Q. 3	Attempt the following	
1)	In how many different ways can five elements be selected in order from a set with three elements when repetition is allowed?	
2)	How many ways are there to assign three jobs to five employees if each employee can be given more than one job?	
3)	How many strings with seven or more characters can be formed from the letters in EVERGREEN?	
4)	How many different strings can be made from the letters in ORONO, using some or all of the letters?	
5)	How many different strings can be made from the letters in AARDVARK, using all the letters, if all three As must be consecutive?	
6)	How many strings with five or more characters can be formed from the letters in SEERESS?	
7)	How many different strings can be made from the letters in ABRACADABRA, using all the letters?	
8)	In how many ways can 12 students be partitioned into four teams, A_1, A_2, A_3 and A_4 so that each team contains three students?	
9)	Draw a tree diagram to show the number of ways so that four friends Amit, Bob, Chetan and Danny sit, so that Bob and Danny always sit together. Hence find the possible ways of this sitting arrangement.	
10)	Draw a tree diagram to show the number of ways so that three houses in a lane be colored with two colors Red and Blue. Also find the number of possibilities of this coloring.	