

Introduction to Probability and Statistics
Sample Test 1

Name: _____

GTID: _____

<i>Problem</i>	<i>Points</i>
1	
2	
3	
4	
5	
6	

TOTAL: _____

Please do show all your work including intermediate steps and also explain in words how you solve a problem. Partial credits are available.

Problem 1. Expand $(3x^2 + y)^6$.

Problem 2. If 4 Americans, 3 French people, and 3 Chinese are to be seated in a row, how many seating arrangements are possible when people of the same nationality must sit next to each other?

Problem 3. A woman has n keys, of which one will open her door.

- (1) If she tries the keys at random, discarding those that do not work, what is the probability that she will open the door on her k th try?
- (2) What if she does not discard previously tried keys?

Problem 4. There is one amoeba in a pond. After every minute the amoeba may die, stay the same, split into two or split into three with equal probability. All its offsprings, if it has any, will behave the same (and independent of other amoebas). What is the probability the amoeba population will die out?

Problem 5. A group of individuals containing b boys and g girls is lined up in random order. Each of the $(b + g)!$ permutations is assumed to be equally likely. What is the probability that the person in i th position is a girl?

Problem 6. Suppose that E and F are mutually exclusive events of an experiment. Show that if independent trials of this experiment are performed, then E will occur before F with probability $P(E)/(P(E) + P(F))$.