

**Practice Class 2**

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MATH2069: Discrete Mathematics and Graph Theory

Semester 1, 2023

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1. Complete the table giving the number of ways to make an ordered selection of  $k$  things from  $n$  possibilities:

repetition allowed	
repetition not allowed	

2. Count the four-digit numbers (positive integers, first digit nonzero)

(a) which are neither 2069 nor 2969

(b) which have no repeated digits

(c) which are the same when reversed

(d) which are divisible by 5

(e) which are divisible by 7

(f) which are odd and have no repeated digits

(g) which are even and have no repeated digits

3. A restaurant offers 3- and 4-course meals. The courses must be chosen from entrées (8 possible), soups (4), mains (11) and desserts (7). At most one of each course may be chosen.

(a) How many possible 4-course meals are there?

(b) How many possible 3-course meals are there?

4. A regular dodecahedron has 12 faces, all of which are pentagons. At each vertex, three faces meet.

(a) The total number of edges is

(b) The total number of vertices is

5. How many ways can you distribute 4 different packages among 8 people A, B, C, D, E, F, G and H if:

(a) there are no restrictions

(b) the packages must go to different people

(c) everyone gets two packages or none

(d) all the packages must be shared between two persons

(e) all the packages must go to the same person

6. For each of the following statements, write T for true or F for false.

(a) The number of diagonals of a regular 10-gon is 70.

(b) The number of surjective functions from a set of size 7

to another set of size 7 is  $7!$ .

(c) The number of injective functions from a set of size 7

to another set of size 7 is  $7!$ .

(d) The number of permutations of a set with  $n$  elements is  $2^n$ .

(e) The number of five-letter strings starting with A is  $26^4$ .

(f) The number of such strings which have no letters repeated is  $26_{(4)}$ .

(g) There are  $7!$  ways to group 8 people into 4 pairs.