

**COT 3100 Fall 2022 Homework #7**  
**Please Consult WebCourses for the due date/time**

**Note: Please justify your answers and why you use each formula. Please leave answers in factorials, combinations and powers.**

1) (15 pts) This question considered permutations of "ARTEMISROCKET".

- a) How many permutations are there total?
- b) How many permutations contain the substring "MISTER"?
- c) How many permutations start and end with vowels?
- d) How many permutations do NOT have consecutive vowels in them?
- e) How many permutations contain the vowels in order (A before Es, before I, before O)?

1) (15 pts) Consider an ant that is walking on a Cartesian grid, starting at (0,0) and ending at (20, 17). The ant always chooses to walk exactly one unit either up (1 unit positive y direction) or to the right (1 unit positive x direction) whenever he arrives at a Lattice point. (A Lattice point is a point with integer coordinates.) For each of the following restrictions, answer how many ways the ant can make its journey/

- a) No restriction other than what is listed above.
- b) Ant can not visit the point (13, 6).
- c) Ant can not visit the points (13, 6) and ( 17, 9).
- d) Ant must visit (2, 7), (5, 9) and (16, 13).
- e) Ant must visit (13, 10) and (10, 14).

3) (10 pts) A class contains 13 girls and 17 boys. For all parts of this question, each boy and girl are distinguishable from one another. Treat each student as distinguishable from each other student. Answer the following questions:

- a) In how many ways can a committee of one boy and one girl be chosen?
- b) In how many ways can a committee of five students be chosen?
- c) In how many ways can a committee of four girls and three boys be chosen?
- d) In how many ways can a committee of six students be chosen such that all the students on the committee are the same sex?
- e) In how many ways can the girls and boys form a line where no two girls are standing next to one another?

4) (5 pts) How many integers in between 1 and 42,000,000 are divisible by 6, 15, or 35?

5) (5 pts) Give a summary of the life and mathematical contributions of Emmy Noether. Please aim for a length of roughly 200 - 400 words. **Your summary must be typed.** Please state the sources you used in writing your summary.