

Name: \_\_\_\_\_

MATH 308

Fall 2023

HW 14: Due 11/14

*“Every hard problem in mathematics has something to do with combinatorics.”*

*–Lennart Carleson*

**Problem 1.** (10pt) Lord of the Wings is a food truck that has a number of offerings: 8 types burgers, 6 types of wings, 5 types of fries, 3 types of wraps, and 4 types of sides.

- (a) How many ways can you order one thing from the menu? [Ans: 26]
- (b) How many ways can you order two different things from the menu? [Ans: 650]
- (c) If you will order a meal consisting of a burger/wing/wrap, a fry, and a side, how many possible orders are there? [Ans: 228]

**Problem 2.** (10pt) Showing all your work, compute the following:

(a)  $\binom{12}{3}$

(b)  ${}_{120}P_5$

(c)  $7!$

(d)  ${}_9C_7$

(e)  $\binom{10}{2,5,3}$

**Problem 3.** (10pt) A standard deck of cards consists of 52 cards: four suits of spades, hearts, diamonds, and clubs. Each suit consists of 13 cards: 2, 3, ..., 9, 10, jack, queen, king, and ace. A six-card game begins with each player being dealt six cards.

- (a) How many possible hands can you begin with? [Ans: 20,358,520]
- (b) How many ways can you be dealt exactly two face cards? [Ans: 6,031,740]
- (c) How many ways can you be dealt at most one face card? [Ans: 8,554,104]
- (d) How many ways can you be dealt cards in ascending order of 'value', e.g. 6, 7, 8, 9, 10, jack? [Ans: 32,768]