

Homework 2: Permutations & Combinations

Due date: Friday 2/12 Submit the assignment via Canvas Assignments. Upload homework as one pdf document. A scanner app like Cam Scanner will make this possible.

Print and write work on this worksheet. Write **clearly** and show **all** work for full credit.

1. Jamie is joining a music club. As part of her introductory package, she can choose from 12 rock selections, 10 alternative selections, 7 country selections and 5 classical selections. If Jamie chooses one selection from each category, how many ways can she choose her introductory package? (2 points)

$$12 \times 10 \times 7 \times 5 = 4200 \text{ ways}$$

2. How many distinct four-letter secret codes can be formed if the first letter must be an S or T? No repetition allowed. (2 points)

$$2 \times 25 \times 24 \times 23 = 27600 \text{ ways}$$

3. In a contest in which 10 contestants are entered, in how many ways can the 4 distinct prizes be awarded? (Meaning there is a different prize for 1st, 2nd, 3rd, and 4th.) (2 points)

$$\frac{10!}{(10-4)!} = 5040 \text{ ways}$$

4. In how many distinct ways can the letters in MISSISSIPPI be arranged? (2 points)

$$\frac{11!}{2! 4! 4!} = 34,650$$

5. Use the binomial theorem to expand $(x + y)^7$ (4 points)

$$1x^7 + 7x^6y + 21x^5y^2 + 35x^4y^3 + 35x^3y^4 + 21x^2y^5 + 7xy^6 + y^7$$

6. For the following problems, consider a group of 50 students. There are 8 Computer Engineering (CE) majors, 12 Computer Science (CS) majors, 20 Electrical Engineering (EE) majors, and 10 Software Engineering (SE) majors. There are no dual major students.

- a. The department chair will pay for 16 students to go to a conference. In how many ways can the 16 students be selected if exactly 4 are selected from each major? (3 points)

$$\binom{8}{4} \binom{12}{4} \binom{20}{4} \binom{10}{4}$$

$$70 \cdot 495 \cdot 4845 \cdot 210$$

35,254,642,500 different ways

- b. 8 of the students are lined up from left to right. In how many ways can this be done when we consider their individual names, not their majors? (2 points)

$$\frac{50!}{(50-8)!} = \frac{50!}{42!} =$$

2.16469×10^{13}

- c. 8 of the students are lined up from left to right. In how many ways can this be done if we consider only their majors, and not their names? (3 points)

$$\binom{8}{2} \binom{12}{2} \binom{20}{2} \binom{10}{2}$$

$$28 \quad 66 \quad 190 \quad 45$$

15800400 different ways