

**MATH1550, Winter 2023:**  
**Exercise Set 1**

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1. You have the following options when purchasing a new car: automatic or manual transmission, with or without A/C, with or without power windows, a choice of 4 stereo systems, and a choice of black, white or red, exterior paint. How many different vehicle setups are possible?
2. A test consists of 12 true-false questions. In how many different ways can a student mark the test paper with one answer to each question?
3. The menu at certain restaurant gives you the following options:

<b>Course:</b>	<b>Options:</b>
Appetizers	Mozzarella sticks, onion rings, or wings
Main	Spaghetti, burger, pizza, chicken wrap or fish
Sides	Salad, fries, soup or veggies
Dessert	Cheesecake, ice cream, pie, or chocolate cake

How many different meal options are possible?

4. How many different permutations of the word *addressee* are there?
5. How many different permutations of the word *rearrange* are there?
6. In a certain election, voters rank 4 candidates from a selection of 12; i.e. they will choose their first, second, third and fourth preferred candidate from the list of 12. How many different selections of this type are possible?
7. In how many ways can 3 of 20 laboratory assistants be chosen to assist with an experiment?
8. A research team composed of 2 chemists and 3 physicists is to be made. If there are 7 chemists and 9 physicists to choose from, how many different ways can this research team be made?
9. You need to hire 2 electricians, 1 plumber and 3 carpenters for a construction job. There are 4, 6, and 8 skilled tradespeople, respectively, from each of these three trades. How many different construction teams can be formed for this job?
10. There are 16 graduate students and four offices labeled A, B, C and D. Offices A and B hold 5 people, office C holds 4 and office D holds 2. How many different office assignments are possible?
11. A child has 12 blocks, of which 6 are black, 4 are red, 1 is white and 1 is blue. If the child puts the blocks in a line, how many arrangements are possible?

12. In how many ways can 8 people be seated in a row if
- (a) There are no restrictions on the seating arrangement?
  - (b) Persons A and B must sit next to each other?
  - (c) There are 5 men and they must sit next to one another?
  - (d) There are 4 married couples and each couple must sit together?
13. In how many ways can 8 people be seated at a round table?
14. How many different 6-card hands be made from a deck of 52 cards so that there is at least one card from each of the 4 suits ( $\heartsuit, \diamondsuit, \spadesuit, \clubsuit$ )? (Do not count the order in which the cards are drawn from the deck.)
15. A dance class consist of 22 students, of which 10 are women and 12 are men. If 5 men and 5 women are to be chosen and then paired off, how many results are possible?
16. Seven different gifts are to be distributed among 10 children. How many distinct results are possible if no child is to receive more than one gift?
17. How many ways can 14 students be placed into 3 offices, A, B and C, where Office A holds 5 people, Office B holds 6 people and Office C holds 3 people?
18. Use the Binomial Theorem to expand  $(4x - 2)^3$ .
19. Expand  $(3x^2 + y)^5$ .
20. What is the coefficient on  $x^{12}y^4$  in the expansion of  $(4x^3 + 3y^2)^6$ ?
21. What is the coefficient of  $x_2^2x_3^3x_4^2$  in the expansion of  $(x_1 + x_2 + x_3 + x_4)^7$ ?
22. Expand  $(x_1 + 2x_2 + 3x_3)^4$ .