Combinations

date: . . . . . , class: . . . . . , student: . . . . . .

1 Exercises

- **Exercise 1:** You have 10 books. In how many ways can you choose 4 of these books to put on the shelf in your room?
- **Exercise 2:** How many *subsets* of 3 elements does the *set* $E = \{a, b, c, d, e, f\}$ have?
- **Exercise 3:** Determine a formula that describes the number of diagonals of a polygon with n sides.
- **Exercise 4:** Expand the expression $(x + y)^5$.
- **Exercise 5:** Expand the expression $(2x + 3)^4$.
- **Exercise 6:** What is the coefficient of a^4b^3 in the expansion of $(a+b)^7$?
- **Exercise 7:** What is the coefficient of x^2y^2 in the expansion of $(2x + 3y)^4$?
- **Exercise 8:** Solve the following equation:

$$\binom{n}{2} + \binom{n-1}{2} = 1$$

- **Exercise 9:** Solve the following equation:

$$\binom{n-1}{n-2} + \binom{n-2}{n-4} = 4$$

- **Exercise 10:** Solve the following inequality:

$$\frac{(n-1)!}{(n-3)!} \leq 2\binom{9}{7}$$

2 Useful links - combinations

- Khan Academy: introductory video about combinations.
  `https://goo.gl/RFgHDA`
- Khan Academy: video about the formula for the number of combinations of n elements taken k *at a time*.
  `https://goo.gl/HvXPTj`
- TED-EX: video about the properties of Pascal's triangle and its relation to binomial coefficients
  `https://goo.gl/tD5nDT`

Glossary

While reading this document you will encounter some words or expressions that you may find difficult to understand: some of them are highlighted by writing them in *italic*, and their meaning is given here below.

- combinations = combinazioni
- subset = sottoinsieme
- set = insieme
- inequality = disequazione
- at a time = alla volta