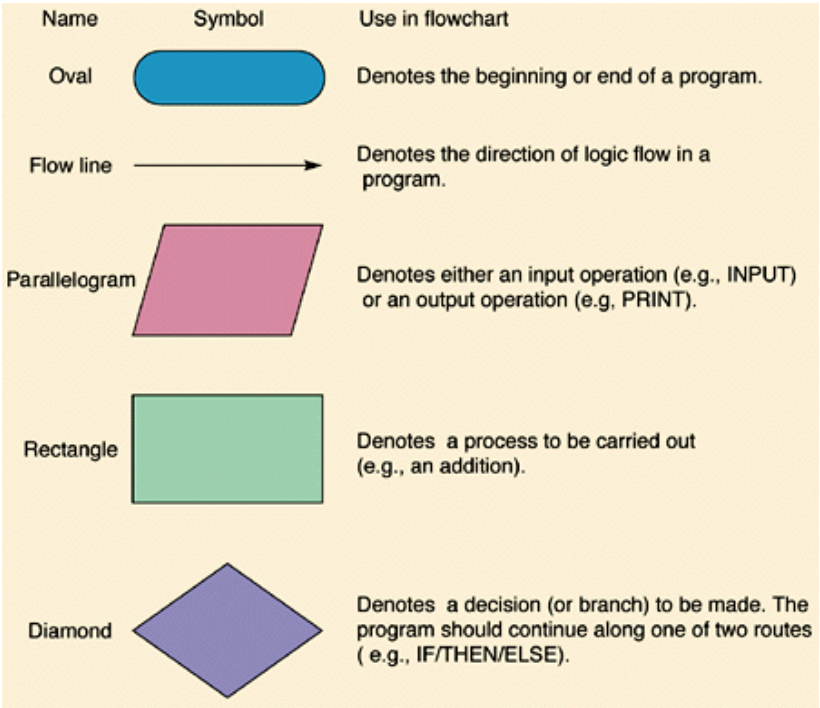
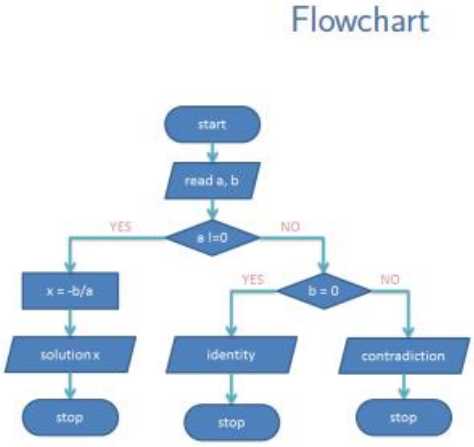
Programming 1 – Exercise Set 1

1. Write an algorithm and flowchart for program calculating the perimeter and the area of a square.
2. Write an algorithm and flowchart for program calculating the perimeter and the area of a circle. Before computation check whether the radius is greater than 0, and if not print a message: *Radius of the circle must be a positive number*.
3. Write an algorithm and flowchart for program to compute quotient and remainder (if necessary) from division of two integers.
4. Write an algorithm and flowchart for program that converts 27° from degrees Fahrenheit (F) to degrees Celsius (C) using the following formula: C = (F - 32) / 1.8.





In each of the following exercises you are given a problem. Analyze it to find a solution, then write an algorithm describing steps that are needed to solve that problem for any given input data. Next draw a flowchart representing that algorithm and try to implement it using C programming language.

5. Convert distance in kilometers to miles (1 mile equals 1.61 kilometers).
6. Check whether an integer number is odd or even (using modulus operator).
7. Find ASCII Value of a character entered by a user.
8. Check whether a character entered by is a letter or not.
9. There are three line segments with the lengths of *a*, *b* and *c*. Check if a triangle can be constructed from those three line segments.
10. Check if a person has a normal weight, is underweight, overweight or obese using a Body Mass Index (weight in kilograms divided by height in meters squared).
    - BMI ≤ 18.5 – underweight
    - 18.5 < BMI ≤ 25 – normal weight
    - 25 < BMI ≤ 30 – overweight
    - 30 < BMI – obesity
11. Using a `for` loop write a fragment of source code that
    - will output each $i = 0, 1, \dots, n$ for a certain value of $n \in \mathbb{N}$.
    - will output each $i = n, n-1, \dots, 0$ for a certain value of $n \in \mathbb{N}$.
    - will output each $j = 1, 3, \dots, 2k-1$ for a certain value of $k \in \mathbb{N}$.
    - will output each $i = 1, 2, 4, 7, 11, \dots, n$ for a certain value of $n \in \mathbb{N}$.
    - will output each $j = 1, 2, 4, 8, 16, \dots, n$ for a certain value of $n \in \mathbb{N}$.
    - will output each $j = 1, 2, 4, 8, 16, \dots, 2^k$ for a certain value of $k \in \mathbb{N}$.
12. Out of numbers $1, 2, \dots, 100$ output to the console screen
    - those that are divisible by 7, i.e. $7, 14, 21, \dots$
    - those that are divisible by 2 but not by 5, i.e. $2, 4, 6, 8, 12, \dots$
    - every other number that is divisible either by 5 or 7, i.e. $5, 10, 15, 21, 28, \dots$
13. Write a fragment of source code that will read natural numbers from keyboard until a value ≤ 0 is read. After last value, without using arrays, output to the screen:
    - minimum value
    - difference between minimum and maximum value
    - arithmetic mean

$$\frac{1}{n}\sum_{i=0}^{n-1} k_i$$

14. Write a program calculating result of operation "*a s b*", where "*a*" and "*b*" are real numbers and "*s*" is +, -, * or /.
15. Write a program counting number of digits of an integer number.
16. Write a program that negation of an integer number taken form user.
17. Write a program swapping of two numbers with and without third variable.
18. Write a program generating multiplication table (for a given range).