

Hong Kong Institute of Vocational Education

IT114105 HD in Software Engineering

IT124106 HD in Computer Systems Administration

ITP3914 Programming

Topic 1: Basic Programming Concepts

Lab 1 – Program Design

Intended Learning Outcomes

Upon completion of this tutorial/lab, you should be able to:

- Identify inputs, outputs, and processing components from a problem description.
- Work out solution steps for the defined problem with sequence, selection and repetition control structures.

Exercise 1

List the seven basic steps in computer program development:

1. Define the problem
2. Outline the solution
3. Turn the outline into steps for solving the problem
4. Test the steps for correctness
5. Code the steps into a targeted programming language
6. Run the program on a computer
7. Document and maintain the program

Exercise 2

What are the inputs and outputs of the problems below?

- (a) Calculating the area of a triangle

Input: base, height (individual values)

Output: area

- (b) Calculating the solution(s) of a quadratic equation $ax^2 + bx + c = 0$

Input: a, b, c (individual values)

Output: X

- (c) Measuring the distance of two cities on Earth

Input: CityA, CityB (Individual values)

Output: distance

Exercise 3

Suggest suitable names for variables storing the data below.

- (a) A student's English name

StudentName

- (b) The examination mark of a student in the module "Programming".

ExamMark PGM

- (c) A student's ID number

studentID

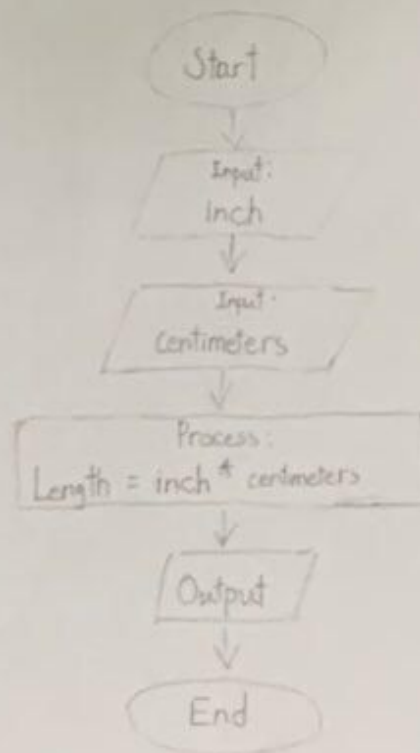
- (d) Number of items in a shopping cart

TotalGoods

Exercise 4

Draw a flow chart to illustrate how the problem below can be solved. Specify clearly the input, process, and output steps with correct flowchart symbols.

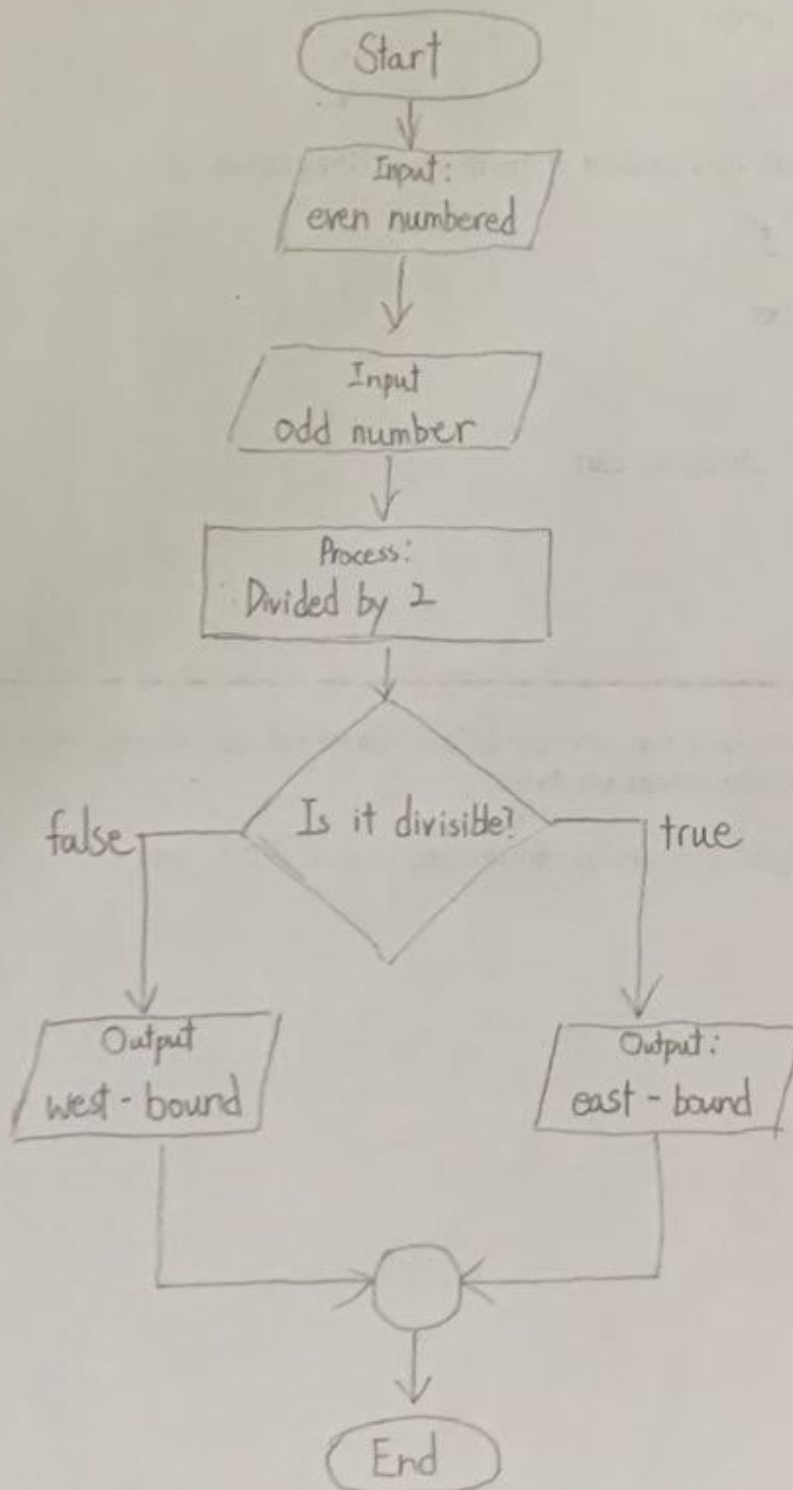
PROBLEM: Convert a length in inches to centimeters (1 inch = 2.54 cm).



Exercise 5

Draw a flow chart to illustrate how the problem below can be solved. Specify clearly the input, process and output steps with correct flowchart symbols.

PROBLEM: In New York City (NYC), even numbered streets are east-bound, odd numbered streets are west-bound. Given a street number of a street in NYC, decide the direction of the street, either east bound or west-bound. Print a message on screen to tell the user the direction.



Exercise 8

Draw a flow chart to illustrate how the problem below can be solved. Specify clearly the input, process, and output steps with correct flowchart symbols.

PROBLEM: As the user to input a positive integer value (n) and then displays '*' times on the screen. A sample execution is shown below.

Please input a positive integer: 5

HINT: Use the repetition construct. At each iteration, you need to determine if enough '*' have been printed.

