

# Year 12 SL/HL

## Homework 1: Basic Computer Architecture (2.1.1 & 2.1.2)

- 1) The CPU contains the: control unit (CU), arithmetic logic unit (ALU), memory address register (MAR), and memory data register (MDR). Briefly describe these four units.
- 2) If one photo takes 3MB of memory how many such photos can be placed inside a 16GB pen drive?
- 3) What is the difference between RAM and ROM?

## Homework 2: Expressions

- 1) Evaluate the following expressions:
  - a)  $3 + 5 * 2$  (arithmetic expression)
  - b)  $0 + (1 + 0).0'$  (Boolean expression)
  - c)  $2 > 7$  (inequality expression)
  - d) What do we mean by operator precedence?

## Homework 3: Binary and Hex

- 1) Fill in:

Denary	Binary	Hex
78		
	110011010011101	
		B7

- 2) Add the two binary numbers 101101 and 10110.
- 3) Perform this binary subtraction  $11001 - 10011$ .
- 4) In one byte express -49
  - a. In sign and magnitude
  - b. In two's complement
- 5) Perform, in one-byte numbers, the subtraction  $99 - 57$  by working in two's complement.

## Homework 4: Java if...else

- 1) Look at the following unfinished program:

```
import java.util.Scanner;
public class Computers
{
    public static void main (String[] args)
    {
        Scanner scan = new Scanner (System.in);
        double speed1, speed2, speed3;
        System.out.println ("Enter the speed of the first computer");
        speed1 = scan.nextDouble();
        System.out.println ("Enter the speed of the second computer");
        speed2 = scan.nextDouble();
```

```
System.out.println ("Enter the speed of the third computer");  
speed3 = scan.nextDouble();
```

(add code here)

```
}  
}
```

- a) Continue the program to find the average speed of the three computers.
  - b) Add more code to find the highest speed.
- 2) Write a program that accepts in input an integer. If the integer is between 0 and 10 the program will display “ok”. If not, the program will display “not ok”.
  - 3) Write a program that asks the user to guess a number between 1 and 10. The user has no more than 3 chances to guess the number. The number is 7.

### Homework 5: Loops

- 1) Write a program that displays the values 10, 11, 12 ... 20.
- 2) Write a program that produces the following sequence of numbers 2, 5, 8, ... 47.
- 3) Write a program that displays a table of values 10, 20, 30 ... 100 (representing degrees Centigrade) and the equivalent temperature in Fahrenheit. The formula to convert Centigrade to Fahrenheit is  $F = C (9/5) + 32$ .
- 4) Write a program that asks the user to input 5 numbers. The program adds their total and displays it.
- 5) Write a program that asks the user to input 10 numbers. The program counts how many of these numbers are greater than zero.
- 6) Write a program that given the input n (a positive whole number) it outputs  $2^n$ .
- 7) Write a program that given inputs b and n (where n is a positive whole number) it outputs  $b^n$ .
- 8) Write a program that receives a number of names. When the input is ‘stop’ it means that there are no more inputs. The program counts the number of entries equal to ‘Mario’.
- 9) Write a program that receives a number of names. When the input is ‘stop’ it means that there are no more inputs. The program calculates the average length of the names.
- 10) Write a program that receives names of two contestants for an election. The program adds the number of votes obtained by Mary and Jane. Then it declares the winner.
- 11) Write a program as above but now add the feature that the names of the contestants are inputted by the user.
- 12) Write a program that asks the user to enter the number 7. If the user does not enter the number 7 the program will keep asking the user to enter a number until the number 7 is entered.

- 13) Write a program that asks the user to enter a number between 1 and 6. The program will keep asking the user to enter a number until a number in this range is entered.
- 14) Write a program that accepts numbers until the zero is entered. The program will add the positive numbers and will discard the negative numbers.
- 15) Write a program that receives in input a positive integer and it outputs an integer with the digits in reverse e.g. 86 will become 68, 9052 will become 2509.

### Homework 6: Methods

- 1) Write a program that consists of three methods. One method calculates the volume of a cylinder ( $\pi r^2 h$ ), another calculates the volume of a sphere ( $V = 4/3 \pi r^3$ ) and the third is the method main. The main method presents a simple menu so that the user can choose which volume to calculate.
- 2) Write a program with the following methods:
  - a) A method that converts degrees Centigrade to Fahrenheit ( $F = C \times 9/5 + 32$ ).
  - b) A method that converts degrees Centigrade to Kelvin ( $K = C + 273.15$ ).
  - c) The main method that asks the user which conversion she wants to calculate and then performs the required calculation.
- 3) Write a program that performs calculations on three numbers. The program must contain the following methods:
  - a) A method that decides whether the three numbers are all equal (it will return 'true' only when all three numbers are equal; in the other cases it will return 'false')
  - b) A method that will return the maximum number.
  - c) A method that calculates (and returns) the average.
  - d) A method that displays the numbers in ascending order.
  - e) e. The method 'main' that asks the user for three numbers and then uses all the other three methods on the numbers.