Lesson 2

Introduction to Programming Language C
Operators - part 2
Reading input

Structured Programming

Reminding From Lecture

- Operators
  - Arithmetic
  - Relational
  - Logical
- Printing to standard output `printf()`
- Reading from standard input `scanf()`

Reading from standard input in C
Function `scanf`

```
int scanf(control_char_array, arg1, arg2, ..., argn)
```

- The control char array actualy contains nessesry information for formatting
- arg1, arg2, ..., argn are arguments for individual data type

Using scanf

Example 1

```c
#include <stdio.h>
int main() {
    char c;
    int number;
    float price;
    scanf("%c%d%f", &c, &number, &price);
    return 0;
}
```

Problem 1

Write a program for computing and printing the circle area and perimeter. The circle radius is read as decimal number.

Solution

```c
#include <stdio.h>
#define PI 3.1415
int main() {
    float r;
    float P = 0, L = 0;
    printf("Enter the radius of the circle: ");
    scanf("%f", &r);
    L = 2 * r * PI;
    P = r * r * PI;
    printf("P = %f\n", P);
    printf("L = %f\n", L);
    return 0;
}
```

Problem 2

Write a program that reads from standard input two integers and prints their sum, difference, product and division remainder.

Solution

```c
#include <stdio.h>
int main() {
    int a, b;
    printf("a = ");
    scanf("%d", &a);
    printf("b = ");
    scanf("%d", &b);
    printf("a + b = %d\n", a + b);
    printf("a - b = %d\n", a - b);
    printf("a * b = %d\n", a * b);
    printf("a %% b = %d\n", a % b);
    return 0;
}
```

Problem 3

Write a program that reads uppercase letter from standard input and prints out in lowercase.

Help: Each character is represented with its ASCII code.

Ex. 'A' = 65, 'a' = 97

Solution

```c
#include <stdio.h>
int main() {
    char c;
    printf("Enter uppercase letter: ");
    scanf("%c", &c);
    printf("%c lowercase is %c\n", c, c + ('a' - 'A'));
    return 0;
}
```

Problem 4

Write a program that reads a character from standard input, and prints 1 if it's lowercase or 0 if it's uppercase.
Help: Use logical and relational operators to toest ASCII code of the character.

Extra: Check if the character is digit.

Solution

```c
#include <stdio.h>
int main() {
    char ch;
    int rez;
    printf("Enter char: ");
    scanf("%c", &ch);
    rez = (ch >= 'a') && (ch <= 'z');
    printf("%d\n", rez);
    return 0;
}
```

Problem 5

Write a program that reads to integers (x, y) from standard input and prints on the standard output the result (z) of the following expression

z = x++ + --y + (x<y)

What is the value of z for x=1, y=2?

Solution

```c
#include <stdio.h>
int main() {
    int x, y, z;
    printf("Enter x and y: ");
    scanf("%d%d", &x, &y);
    z = x++ + --y + (x < y);
    printf("z = %d\n", z);
    return 0;
}
```

Problem 6

Let r = (x < y || y < z++)
What is the value of r for x=1, y=2, z=3?
What is the value of z?

Solution

```
r = 1
z = 3
```

Let: r = (x > y && y < z++)
What is the value of r for x=1, y=2, z=3?
What is the value of z?

Solution

```
r = 0
z = 3
```

Problem 7

Let:

```c
int x, y;
y = scanf("%d", &x);
```

What is the value of y when the the value 5 is entered in the SI?

Solution

y = 1

Let:

```c
int x, y, z;
z = scanf("%d%d", &x, &y);
```

What is the value of z when values of 5 and 10 are entered in the SI?

Solution

z = 2

Problem 8

Write a program that reads from SI product price and then will print the price with calculated sales tax.
Help: Sales tax is 18% of the starting price.

Solution

```c
#include <stdio.h>
int main() {
    float price;
    printf("Enter the price: ");
    scanf("%f", &price);
    printf("The total price e %.2f\n", price * 1.18);
    return 0;
}
```

Write a program that reads from SI product price, payments
number and interest rate (interest rate is percentage number from
0 to 100). The program should print the payments value and the
total sum for the product.
Help: First calculate the total sum, then the payment.

```c
#include <stdio.h>
int main() {
    float price, interest, payment, total;
    int paymentsNumber;
    printf("Enter the prorduct price: ");
    scanf("%f", &price);
    printf("Enter the payments number: ");
    scanf("%d", &paymentsNumber);
    printf("Enter the interest: ");
    scanf("%f", &interest);
    total = price * (1 + interest / 100);
    payment = total / paymentsNumber;
    printf("The payment is: %.3f\n", payment);
    printf("Total payment is %.3f\n", total);
    return 0;
}
```

Problem 10

Write a program that reads from SI one three digit number. The program should print the most and least significant digit.

Example: For the number 795, the output should be:

 Most significant digit is 7, and least significant is 5.

Help: Use division and modulo operation.

```c
#include <stdio.h>
int main() {
    int number;
    scanf("%d", &number);
    printf("Most significant digit is %d, and least significant digit is %d.\n",
        number / 100,
          number % 10);
    return 0;
}
```

Problem 11

Write a program that reads from SI the birth date in format
(ddmmgggg). The program should print the day and month of birth.
Example: For the following number 18091992, the program should
print: 18.09
Help: Use division and module operators.

Solution

```c
#include <stdio.h>
int main() {
    int date;
    int day, month;
    printf("Enter date of birth: ");
    scanf("%d", &date);
    day = date / 1000000;
    month = (date / 10000) % 100;
    printf("Your date of birth is %02d.%02d\n", day, month);
    return 0;
}
```

Extra: The problem can be solved by using scanf("%2d%2d", &den, &mesec)

Materials and Questions

Lectures, exersexes and announcements
courses.finki.ukim.mk

Source code of all examples and problems
https://github.com/tdelev/SP/tree/master/latex/src

Questions and discussion
forum.finki.ukim.mk