Data Structures and Program Design Using C

SCS 1301

AY 22 - Semester 1

Exercise I

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1. Which of the following are valid variable names?
   (a) ABC$13
   (b) _ACB76
   (c) abc123_5
   (d) 98test
   (e) test item
   (f) fullCredit
   (g) abc_ABC
   (h) $cd
   (i) int
   (j) if-else

2. **sizeof(parameter)** function is used to find the amount of space a given data type takes in memory. The parameter can be a variable declared in the program or a data type (e.g., int, float, etc.). Write a program to output the space taken by the primitive types.

3. Consider the following C program (hello.c) and observe the intermediate outputs of the C compiler.

```
#include <stdio.h>

int main()
{
    printf("Hello World\n");

    return 0;
}
```

   (a) Preprocessor output ($gcc -E hello.c)
   (b) Compiler output before assembler ($gcc -S hello.c)
   (c) Object file creation ($gcc -c hello.s)
   (d) Add comments to the program and observe how comments are handled by the preprocessor.
   (e) How is the *printf*(...) represented in the .s file genereated?

4. Using the $< limits.h >$ and $< float.h >$ header files, write a program to find the maximum and minimum possible values of primitive data types in the C language.

5. Write C programs to produce the following formatted outputs given below using the $printf(...)$ function.

   (a) Consider a double variable x with a value of 125.456734516547332453425 and produce the following output:

      i. 125.456735
      ii. 125.457
      iii. +1e+02
      iv. 1.254567E+02
      v. 0X1.F5D3B2368E19CP+6

   (b) Consider an integer variable y with a value of 76 and produce the following output:

      i. 76
      ii. 4c
      iii. 4C
      iv. 114
      v. 0x4c
      vi. 0x4C
      vii. 0114
      viii. 0000000076
      ix. $< 8spaces >$76

   (c) Consider five integer variables: day, month, year, hour, and minute. The initial values are 30, 4, 2024, 12, and 57. Produce the following date-time output:

      i. 2024-04-30 12:57
      ii. 30/04/2024 12:57 Hrs
      iii. 4.30.2024 12 Hours 57 Minutes
      iv. 7e8430-012057

   (d) Consider a character variable c with the initial value 'A' and produce the following output:

      i. A
      ii. 65

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