INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Programming in C and C++ (CSC-101)

Assignment 3 — 60 marks

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Q-1) Write a C program to compute the area, circumference, and diameter of a circle. Use `PI` as a macro in your program, and also include the standard header file that provides the value of `PI`. Ensure both methods of using `PI` are implemented correctly and clearly in the code. **[5 marks]**

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```c
#include<stdio.h>
#include<math.h>

#define PI 3.14159

int main() {
        double r;
        printf("Enter the value of radius(r):");
        scanf("%lf",&r);
        float a, c, d;
        a = PI*pow(r,2);
        c = 2*PI*r;
        d = 2*r;

        printf("Area of this circle(a) = %f \n",a);
        printf("Circumference of this circle(c) = %f \n",c);
        printf("Diameter of this circle()d = %f \n",d);

        return 0;
}
```

14,0-1 All

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```
garvmehta991@omnitrix-1000:~/25114035/Assignment3/Question1$ vim file.c
garvmehta991@omnitrix-1000:~/25114035/Assignment3/Question1$ gcc file.c -lm
garvmehta991@omnitrix-1000:~/25114035/Assignment3/Question1$ ./a.out
Enter the value of radius(r):5
Area of this circle(a) = 78.539749
Circumference of this circle(c) = 31.415899
Diameter of this circle()d = 10.000000
garvmehta991@omnitrix-1000:~/25114035/Assignment3/Question1$ ./a.out
Enter the value of radius(r):5.235
Area of this circle(a) = 86.095978
Circumference of this circle(c) = 32.892448
Diameter of this circle()d = 10.470000
garvmehta991@omnitrix-1000:~/25114035/Assignment3/Question1$ vim file.c
garvmehta991@omnitrix-1000:~/25114035/Assignment3/Question1$
```

Q-2) Write a C program to take input for principal (P) and time (t), then compute the final amount (A) using the below formula. ***[For example : If you enter P: 100000, t: 6, the A is 170778.56]*** **[5 marks]**

$$A = P\left(1 + \frac{9}{5 \times 100}\right)^{5t}$$

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```c
#include<stdio.h>
#include<math.h>

int main () {
        double p, t ;

        printf("Enter the principal value(P):");
        scanf(" %lf",&p);

        printf("Enter the time period(t):");
        scanf(" %lf",&t);

        float x = 1 +(9.0/500) ;
        double A = p*pow(x,5*t);

        printf("The Final Amount = %.2lf",A);

        return 0;
}
```

15,1-8 All

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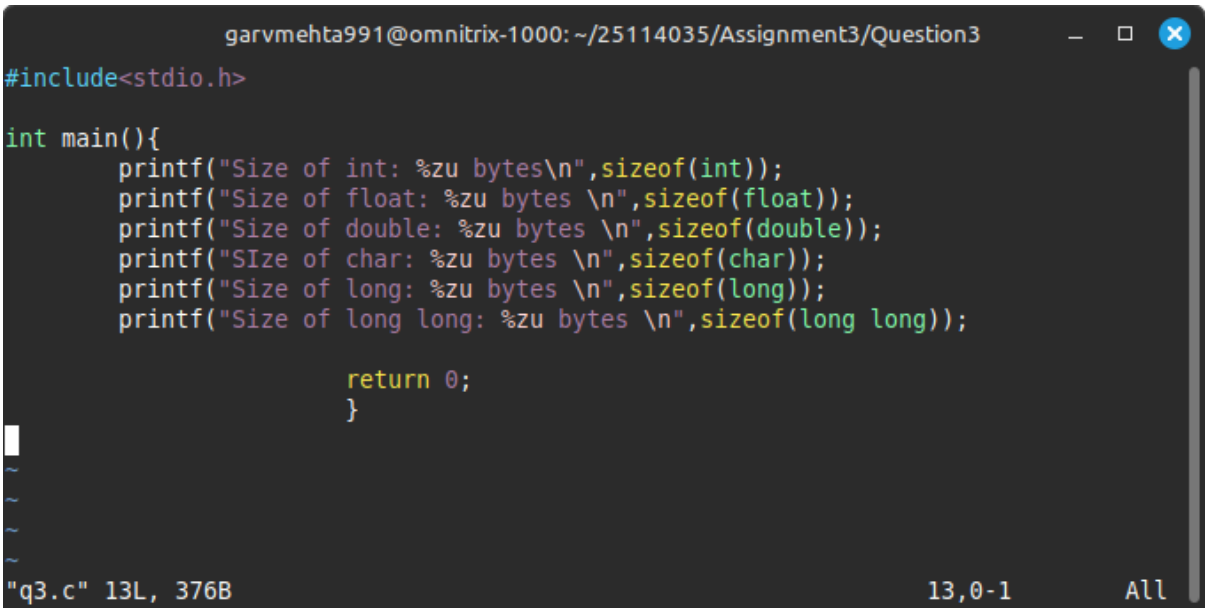
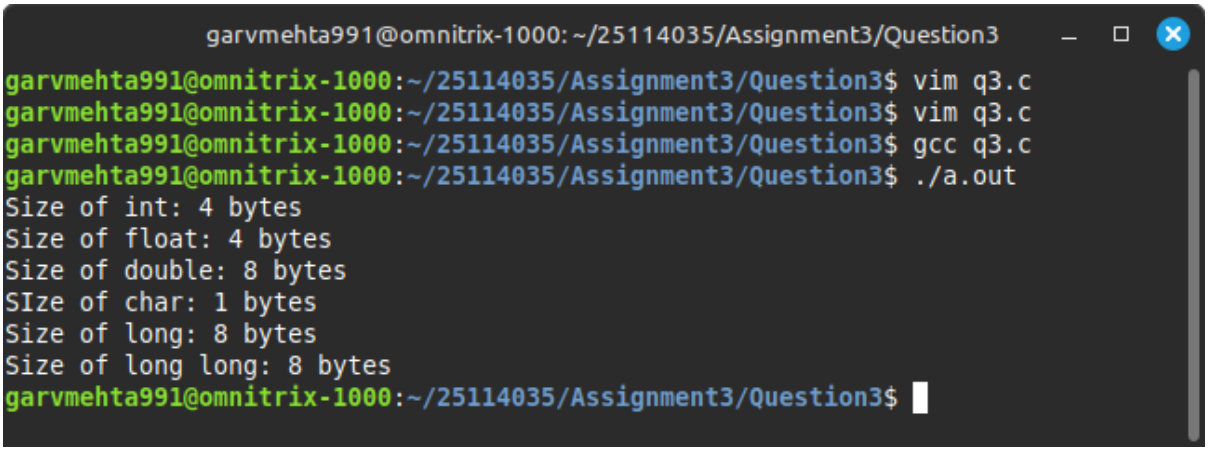
```
garvmehta991@omnitrix-1000:~/25114035/Assignment3/Question2$ vim file.c
garvmehta991@omnitrix-1000:~/25114035/Assignment3/Question2$ gcc file.c -lm
garvmehta991@omnitrix-1000:~/25114035/Assignment3/Question2$ ./a.out
Enter the principal value(P):100000
Enter the time period(t):6
The Final Amount = 170778.59
garvmehta991@omnitrix-1000:~/25114035/Assignment3/Question2$
```

Q-3) You are developing an application for embedded systems with limited memory. To optimize your program and ensure it fits within memory constraints, you need to find out how much memory different data types like integers, floating-point numbers, and characters occupy on the target machine. Write a C program that helps you inspect the memory size (in bytes) required to store different primitive data types on the system where the program runs **[5 marks]**





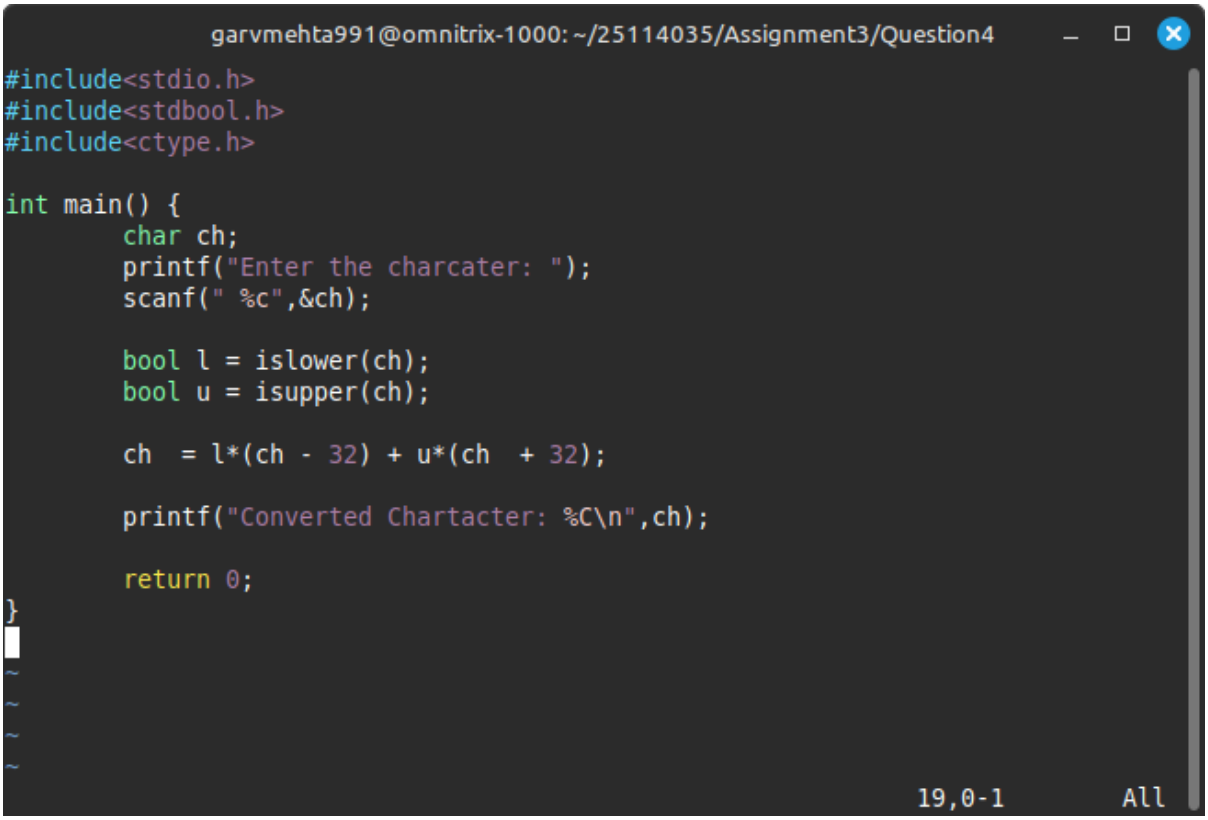
Q-4) Write a program to convert a small letter char to a capital letter char and vice-versa - a -> A, b -> B , B -> b…….

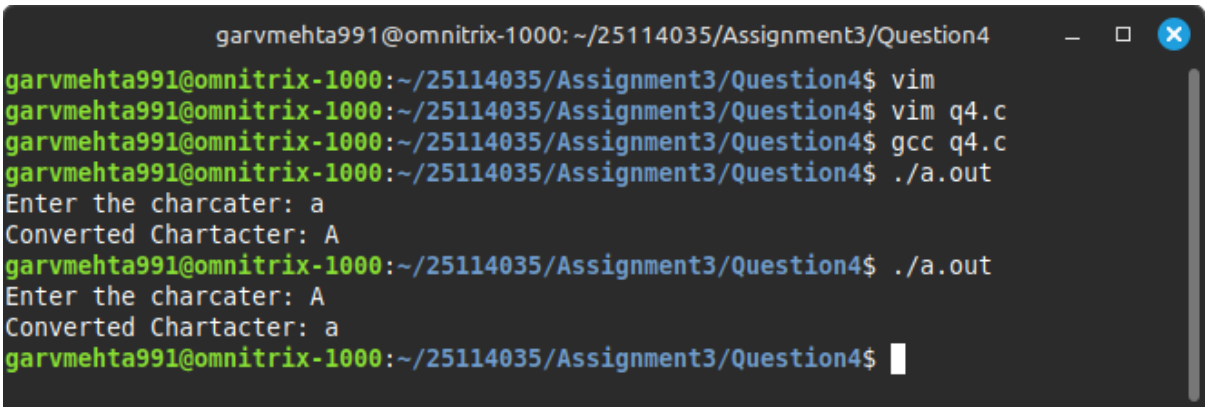
[15 marks]

*[Note : Do NOT use any if statements or conditional operators (?:). Use only arithmetic operators (+, -, *, /, %) for computations. Use the following header files and their features:*

#include <stdbool.h>: to declare variables of type bool (which stores values 1 or 0)

#include <ctype.h>: to use the functions islower(ch) and isupper(ch) to check whether a character (ch) is lowercase or uppercase.]





Q-5) Declare a float type variable e= 2.718281828 and print the following using variable e. **[15 marks]**

3
3.
2.7
2.72
2.718282
2.718282
2.7182818

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```
#include <stdio.h>
#include <math.h>

int main() {
        double e = 2.718281828 ;

        printf(" %0.0lf\n",e);
        printf(" %0.1lf\n",e);
        printf(" %0.2lf\n",e);
        printf(" %0.6lf\n",e);
        printf(" %0.8lf\n",e);
        printf(" %0.9lf\n",e);

        return 0;
}
~
~
                                                    16,0-1        All
```

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```
garvmehta991@omnitrix-1000:~/25114035/Assignment3/Question5$ vim q5.c
garvmehta991@omnitrix-1000:~/25114035/Assignment3/Question5$ gcc q5.c
garvmehta991@omnitrix-1000:~/25114035/Assignment3/Question5$ ./a.out
 3
 2.7
 2.72
 2.718282
 2.71828183
 2.718281828
garvmehta991@omnitrix-1000:~/25114035/Assignment3/Question5$
```

Q-6) Write a C programme to print formatted output using different variables. Let's say a=1,b=12,c=123,d=1234,f=12345. Print the values of a to f such that it looks like as shown in a. Similarly take different character type variables and print these variables as shown in b. *[Do not use space or print '0' to get the desired output]* **[15 marks]**

a)

```
00001
00012
00123
01234
12345
```

b)

```
a
ab
abc
abcd
abcde
```

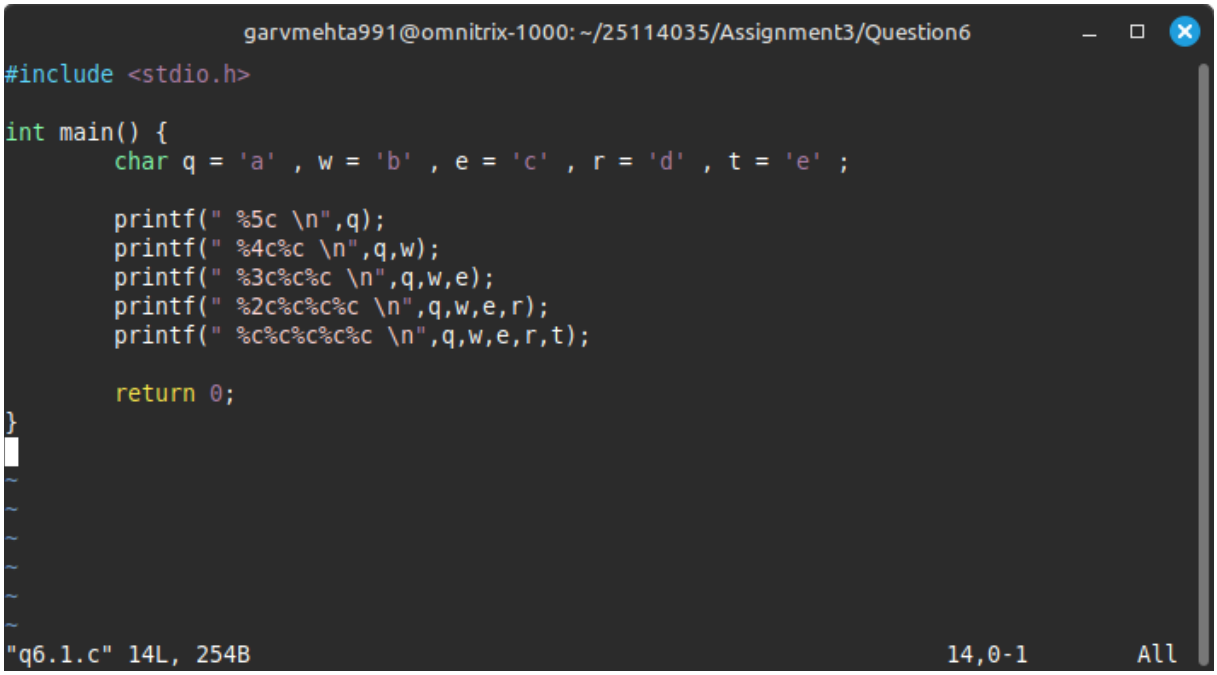
```
garvmehta991@omnitrix-1000:~/25114035/Assignment3/Question6$ vim q6.c
garvmehta991@omnitrix-1000:~/25114035/Assignment3/Question6$ gcc q6.c -o q6
garvmehta991@omnitrix-1000:~/25114035/Assignment3/Question6$ ./q6
 00001
 00012
 00123
 01234
 12345
garvmehta991@omnitrix-1000:~/25114035/Assignment3/Question6$ vim q6.1.c
garvmehta991@omnitrix-1000:~/25114035/Assignment3/Question6$ gcc q6.1.c
garvmehta991@omnitrix-1000:~/25114035/Assignment3/Question6$ gcc q6.1.c -o q6.1
garvmehta991@omnitrix-1000:~/25114035/Assignment3/Question6$ ./q6.1
     a
    ab
   abc
  abcd
 abcde
garvmehta991@omnitrix-1000:~/25114035/Assignment3/Question6$
```

garvmehta991@omnitrix-1000: ~/25114035/Assignment3/Question6

```
#include<stdio.h>

int main() {
        char z = 48;
        int a = 1 , b = 12 , c = 123 , d = 1234 , f = 12345 ;

        printf(" %c%c%c%c%d \n",z,z,z,z,a);
        printf(" %c%c%c%d \n",z,z,z,b);
        printf(" %c%c%d \n",z,z,c);
        printf(" %c%d \n",z,d);
        printf(" %d \n",f);
        return 0;
}
~
~
~
~
~
"q6.c" 15L, 263B                                              14,0-1        All
```


garvmehta991@omnitrix-1000: ~/25114035/Assignment3/Question6
#include <stdio.h>
int main() {
char q = 'a' , w = 'b' , e = 'c' , r = 'd' , t = 'e' ;
printf(" %5c \n",q);
printf(" %4c%c \n",q,w);
printf(" %3c%c%c \n",q,w,e);
printf(" %2c%c%c%c \n",q,w,e,r);
printf(" %c%c%c%c%c \n",q,w,e,r,t);
return 0;
}
"q6.1.c" 14L, 254B
14,0-1
All