**PSG COLLEGE OF TECHNOLOGY, COIMBATORE – 641 004**

**DEPARTMENT OF APPLIED MATHEMATICS AND COMPUTATIONAL SCIENCES**

**I M.Sc (SS/TCS) - C Programming Lab – Work Sheet 4**

1. Write a C program to guess an integer number and ask the user to find the guessed number. If the guess is correct, print the message CORRECT otherwise print the message as follows.

* Print TOO HIGH if guessed number is 10 times more than the given number
* Print TOO LOW if guessed number is 10 times less than the given number
* Print CLOSE if guessed number is 5 times more / less than the given number
* Print TOO CLOSE if the absolute difference between the guessed number and the given number is less than 5.

Note: Use srand and rand functions to generate random number.

2. Write a C program to print mthmultiplication table up to n terms.

3. A machine is purchased which will produce earning of Rs. 1000 per year while it lasts. The machine costs Rs. 6000 and will have a salvage of Rs. 2000 when it is condemned. If 12 percent per annum can be earned on alternate investments what would be the minimum life of the machine to make it a more attractive investment compared to alternative investment?

4. A number is said to be perfect if it is equal to the sum of all numbers which are its factors (excluding itself). So, for example, 6 is perfect, because it is the sum of its factors 1,2,3. Write a program which determines if a number is perfect. It should also print its factors.

5. Write a program that takes as input a natural number x and prints the smallest palindrome larger than x.

6. A baseball player’s batting average is calculated as the number of hits divided by the official number of at-bats. In calculating official at-bats, walks, sacrifices, and occasions when hit by the pitch are not counted. Write a program that takes an input containing total number of players, and for each player player number and batting records. Trips to the plate are coded in the batting record as follows: H—hit, O—out, W—walk, S—sacrifice, P—hit by pitch. The program should output for each player the input data followed by the batting average. (Note: Number of batting records may vary from player to player. So for each batting record get option to read next record. )

Sample input:

Total Number of players : 3

Enter Player Number : 12

Enter batting record : H

You wanna continue? [y/n] y

Enter batting record : H

You wanna continue? [y/n] y

Continues …..

So, for example

12 HOOOWSHHOOHPWWHO

4 OSOHHHWWOHOHOOO

7 WPOHOOHWOHHOWOO

Corresponding output:

Player 12's record: HOOOWSHHOOHPWWHO

Player 12's batting average: 0.455

Player 4's record: OSOHHHWWOHOHOOO

Player 4's batting average: 0.417

Player 7's record: WPOHOOHWOHHOWOO

Player 7's batting average: 0.364

7. Binomial coefficients are used in the study of binomial distributions and reliability of multi-component redundant systems. It is given by

B(m,0) = 1 B(0,0) = 1

A table of binomial coefficients is required to determine the binomial coefficient for any set of m and x. Write a program to print the table of binomial coefficients.Sample output for m = 10 is,

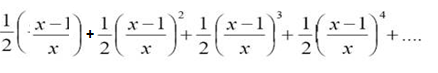
|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| m/x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 0 | 1 |  |  |  |  |  |  |  |  |  |  |
| 1 | 1 | 1 |  |  |  |  |  |  |  |  |  |
| 2 | 1 | 2 | 1 |  |  |  |  |  |  |  |  |
| 3 | 1 | 3 | 3 | 1 |  |  |  |  |  |  |  |
| 4 | 1 | 4 | 6 | 4 | 1 |  |  |  |  |  |  |
| 5 | 1 | 5 | 10 | 10 | 5 | 1 |  |  |  |  |  |
| 6 | 1 | 6 | 15 | 20 | 15 | 6 | 1 |  |  |  |  |
| 7 | 1 | 7 | 21 | 35 | 35 | 21 | 7 | 1 |  |  |  |
| 8 | 1 | 8 | 28 | 56 | 70 | 56 | 28 | 8 | 1 |  |  |
| 9 | 1 | 9 | 36 | 84 | 126 | 126 | 84 | 36 | 9 | 1 |  |
| 10 | 1 | 10 | 45 | 120 | 210 | 252 | 210 | 120 | 45 | 10 | 1 |

8. Write a program to compute the value of Euler’s number e, that is used as the base of natural logarithms using the formula.

E = 1 + 1/1! + 1/2! + 1/3! + … + 1/n!

Read the number of terms N as input. Your program should calculate the e value upto N terms or till the difference between two successive values of e is less than 0.00001. Print the Euler’s number and the number of terms used.

9. [The natural logarithm can be approximated by the following series.](http://www.sirjameel.com/lectures/c_language/let_us_c/chapter3/23.html)



If x is input through the keyboard, write a program to calculate the sum of first n terms of this series.

10. Write a program to generate all combinations of 1, 2 and 3 using for loop.

11. According to a study, the approximate level of intelligence of a person can be calculated using the following formula: i = 2 + ( y + 0.5 x )

Write a program, which will produce a table of values of i, y and x, where y varies from 1 to 6, and, for each value of y, x varies from 5.5 to 12.5 in steps of 0.5.

12 Write a program to generate the following patterns.

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13. Write a program to print the below multiplication table.

1 2 3 4 5 6 7 8 9

2 4 6 8 10 12 14 16 18

3 6 9 12 15 18 21 24 27

4 8 12 16 20 24 28 32 36

5 10 15 20 25 30 35 40 45

6 12 18 24 30 36 42 48 54

7 14 21 28 35 42 49 56 63

8 16 24 32 40 48 56 64 72

9 18 27 36 45 54 63 72 81

14. We want to show calendar of a specific month. Write a program to print the calendar for the given month. Input data are (1) day of the week of an input month, and (2) number of days of the input month. Each figure should be right-aligned.

**Caution:** When input figure is not appropriate, e.g. day of the week is not within 0 to 6, or month is not within 1 to 12, an error message should be shown.

**Sample**

Calendar of a specific month will be shown.

Which day of the week does the month start?

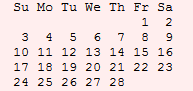
Input figure among following figures.

0:Sun, 1:Mon, 2:Tue, 3:Wed, 4:Thu, 5:Fri, 6:Sat

**5**

How many days does the month have? Input figure

**28**



15. For a group whose student number is known, we want to calculate means of english, mathematics and physics, respectively. Using while-loop, program to meet this requirement.

**Sample**

Input number of students

**3**

English score of student 1 **50**

Math score of student 1 **70**

Physics score of student 1 **60**

English score of student 2 **40**

Math score of student 2 **20**

Physics score of student 2 **30**

English score of student 3 **100**

Math score of student 3 **100**

Physics score of student 3 **90**

Mean of english = 63.333

Mean of math = 63.333

Mean of physics = 60.000