Set 1

1. Write a program that displays water bills for *n* customers. Your program should prompt the user to enter an integer account number, a character use code, and a real number representing the gallons of water used. The output from your program should include the account number, message indicating the type of usage, and the amount of money due from the user. Draw a flowchart for your program. The water rates vary depending on the type of usage. A code of H means home use, a code of C means commercial use, and a code of I means industrial use. Any other code value should be treated as an error. Water rates are computed as follows:

   Code H:$5.00 plus $0.005 per gallon

   Code C: $1000.00 for the first 4 million gallons used plus
   $0.025 for each additional gallon used

   Code I: $1000.00 if usage does not exceed 4 million gallons
   $2000.00 is usage is between 4 million and 10 million gallons
   $3000.00 is 10 million gallons or more

2. Write a program to print all the number in the range 1..100 that are neither multiples of 7 nor multiples of 9.

3. Write a program to compute the power loss in a transmission line with a resistance of 0.05 ohms/mile. Compute the power loss if 500 kW of power is transmitted from a power generating station to cities at distance of 20, 30, 40, …., 100 miles at 100 V and 200 V.

   Current I = power transmitted / volts transmitted
   Resistance R = r * miles where r is resistance per mile
   Power loss = i^2 * R.

4. Write a program to generate the following output using loops for a user-given value n:

   1 * * * * *
   1 2 * * * *
   1 2 3 * * *
   1 2 3 4 * *
   1 2 3 4 5 *
   1 2 3 4 5 6

5. Write a 'c' program to calculate the geometric average of a list of numbers. The input should terminate when the user types 999 as the input value.

Set 2

1. Write a program to generate the following output using loops for a user-given value n:

```
*
* *
* * *
* * * *
* * *
* *
*
```

2. Write a program to compute and print a table of torsion shear stresses for circular rods having various torsion loads at various offsets.

D- Diameter of rod, P-torsion load in pounds, L – offset
Ts= (16PL)/(PI*D^3)
Sample O/P
Diameter: 5
Torsion Load : 10000

Length offset	Torsion shear stress
10	40.74.37
15	6111.55
20	8148.73

3. Write a program that makes a table of numbers that are divisible by 3,5, and 9.Also find the sum of all integers between 100 to 200 which are divisible by 8.
4. Write a program that for all positive integers i,j,k and l from 1 to 1000, find and prints all combinations of I,j,k,l such that i+j+k=l
5. (Calculating the Value of PI) Calculate the value of PI from the infinite series

$$\pi = 4 - \frac{4}{3} + \frac{4}{5} - \frac{4}{7} + \frac{4}{9} - \frac{4}{11} + \cdots$$

Set 3

1. A player rolls two dice. Each die has six faces. These faces contain 1, 2,3,4,5 and 6 spots. After the dice have come to rest, the sum of the spots on the two upward faces is calculated. If the sum is 7 0r 11 on the first throw, the player wins. If the sum is 2,3 or 12 on the first throw, the player loses. If the sum is 4, 5,6,8,9 or 10 on the first throw, then that sum becomes the player's point." To win, you must continue rolling the dice until you "make your point." The player loses by rolling a 7 before making the point. Model the scenario by writing a C program.

2. Write a program to find compound interest using formula for simple interest.

3. An international standard book number(ISBN) is used to uniquely identify a book. It is made of ten digits, write a program that tests an ISBN to see if it is valid. For an ISBN number to be valid, the weighted sum of the 10 digits must be evenly divisible by 11.To find the weighted sum, the value of each position is multiplied by its relative position. starting from the right, and the sum of the products is determined.(algorithm) Eg if 0078818095 0*10 + 0*9+ 7*8 + 8*7 …..=weighted sum of digits

4. The Browns are buying a new DVD player. Three stores have the model they want on sale this week. Here are the ads:

   Radio Shop: Regular Price=`7000, Discount=20% off
   Discount City: Regular Price=`5000, Discount=30% off
   Ralph's: Regular Price=`2300, Discount=10% off and Extra 20% off '
   Write a C program that will help The Browns to choose the store. The program should output the name of the store and the price to be paid.

5. Given two rectangles RA and RB, write a program to check if they overlap or not.

Set 4

1. Write a program to display the following output (number of rows given by the user.) if rows=3 output is

```
    1
  2   2
3   3   3
```

2. Write a program to determine whether the character entered is a capital letter, a smaller case letter, a digit or a special symbol. Your code should terminate when the user presses 'S' or's'. (Note: A-Z (65-90), a-z (97-122), 0-9(48-57), special symbols (0-47, 58-64, 91-96,123-127))

3. WAP to implement a binary calculator that provides the result of binary operations on numbers using SWITCH..CASE. The program should terminate when the user presses 'S' – Stop.

4. Write a C program to display:-
   i. Number and its square, if the number is even.
   ii. Number and its cube, if number is odd.
   For all the numbers in a given range, perform odd even test using bitwise operator and your program should not use an IF statement.

5. Write a 'c' program to print all integers that are not divisible by either 2 or 3 and lie between 1 and 100. The program must also account for the number of such integers and print the result.

Set 5

1. The Pythagorean Theorem states that the sum of the squares of the sides of a right triangle is equal to the square of the hypotenuse. For example, if two sides of a right triangle have lengths of 3 and 4, then the hypotenuse must have a length of 5. Together the integers 3, 4, and 5 form a Pythagorean triple. There are an infinite number of such triples. Given two positive integers, m and n, where m > n, a Pythagorean triple can be generated by the following formulas:

   side1 = m2 - n2

   side2 = 2mn

   Hypotenuse = m2 + n2

   The triple (side1 = 3, side2 = 4, hypotenuse = 5) is generated by this formula when m = 2 and n = 1. Write a program that prints all the Pythagorean triples generated by the formulas above in a given range of input.

2. Print the given number in words eg. 21 two one.
3. Write a 'c' program using loops to print the following output:

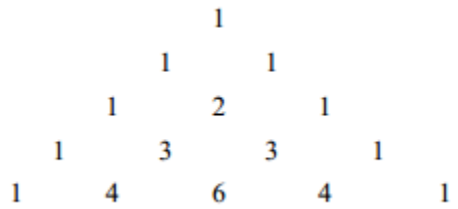
```
A B C D E F G F E D C B A
A B C D E F   F E D C B A
A B C D E       E D C B A
A B C D           D C B A
A B C               C B A
A B                   B A
A                       A
```

4. On the first day, a store gives d% discount off the price of a certain item. On day 2, it gives d% off the day 1 price. On day 3, it gives d% off the day 2 price, etc. Write a program to input the original price of an item and d, and determine on what day the price drops to less than half the original price.

5. Print the output of x-x^3/3!+x^5/5!-x^7/7!+….

Set 6

1. Write a 'c' program using loops to produce the following output:



2. Print the output of 1-x^2/2!+x^4/4!-x^6/6!+….
3. Given three corner points of a triangle, and one more point P. Write a program to check whether P lies within the triangle or not.
4. Write a program to process a collection of daily high temperatures. Your program should count and print the number of hot days (high temperature 85 or higher),the number of pleasant days (high temperature 60–84), and the number of cold days (high temperatures less than 60). It should also display the category of each temperature. Test your program on the following data:
   55 62 68 74 59 45 41 58 60 67 65 78 82 88 91
   92 90 93 87 80 78 79 72 68 61 59
   and Modify your program to display the average temperature (a real number) at the end of the run.
5. In an organization, the employees are grouped according to their basic pay for the purpose of certain perks. The pay-range and the number of employees in each group are as follows:

Group	Pay-range	No of employees
1	750-1500	12
2	1501-3000	23
3	3001-4500	35
4	4501-6000	20
5	Above 6000	11

   Write a 'c' program to draw a histogram to highlight group sizes.

Set 7

1. Write a ‘c’ program to print the following pattern using loops:

```
Z
YZY
XYZYX
RXYZYXR
XYZYX
YZY
Z
```

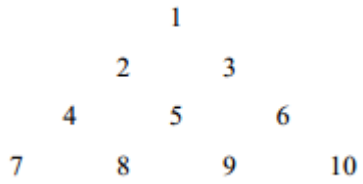
2. Bob's Discount Bolts charges the following prices:

   - 5 cents per bolt
   - 3 cents per nut
   - 1 cent per washer

   Write a program that asks the user for the number of bolts, nuts, and washers in their purchase and then calculates and prints out the total. As an added feature, the program checks the order. A correct order must have at least as many nuts as bolts and at least twice as many washers as bolts; otherwise the order has an error. For an error the program writes out "Check the Order: too few nuts" or "Check the Order: too few washers" as appropriate. Both error messages are written if the order has both errors. If there are no errors the program writes out "Order is OK." In OK case the total price in cents (of the specified number of items) is written out.
3. Suppose that P dollars are borrowed from a bank, with the understanding that a dollars will be repaid each month until the entire loan has been repaid. Part of the monthly payment will be interest, calculated as I percent of the current unpaid balance. The remainder of the monthly payment will be applied toward reducing the unpaid balance. Write a C program that will determine the following information:
   (i) The amount of interest paid each month.
   (ii) The amount of money applied toward the unpaid balance each month.
   (iii) The cumulative amount of interest that has been paid at the end of each month.
   (iv) The amount of the loan that is still unpaid at the end of each month.
   (v) The number of monthly payments required to repay the entire loan.
   (vi) The amount of the last payment (since it will probably be less than A).
   Test your program using the following data: P = $40,000; A = $2,000; i =1%per month.
4. Write a ‘c’ program to print the square roots of individual digits of a given number. Consider each digit as a perfect square. For example if the number is 494 the output must be 232.
5. Consider a currency system in which there are notes of 7 denominations namely Re 1, Rs 2, Rs 5, R 10, Rs 20 , Rs 50, Rs 100. If a sum of rupees n is entered through the keyboard write a c program to compute the smallest number of notes that will combine to give Rs n.

Set 8

1. Write a 'c' program using loops to produce the following output:



2. Write a program that asks the user to enter a number. The program will then repeat printing the number for as many times as equal to the number of digits in it.
3. A company pays its employees as managers (who receive a fixed weekly salary), hourly workers (who receive a fixed hourly wage for up to the first 40 hours they work and "time-and-a-half"—i.e., 1.5 times their hourly wage—for overtime hours worked), commission workers (who receive $250 plus 5.7% of their gross weekly sales), or pieceworkers (who receive a fixed amount of money for each of the items they produce—each pieceworker in this company works on only one type of item). Write a program to compute the weekly pay for each employee. You do not know the number of employees in advance. Each type of employee has its own pay code: Managers have paycode 1, hourly workers have code 2, commission workers have code 3 and pieceworkers have code 4. Use a switch to compute each employee's pay based on that employee's paycode. Within the switch, prompt the user (i.e., the payroll clerk) to enter the appropriate facts your program needs to calculate each employee's pay based on that employee's paycode.
4. An integer number is said to be a perfect number if its factors, including 1 (but not the number itself), sum to the number. For example, 6 is a perfect number because 6 = 1 + 2 + 3. Prints all the perfect numbers between 1 and 1000.
5. Write a program to print all the number in the range 1..100 that are either multiples of 11 or multiples of 13.

Set 9

1. Write a program that prints the following diamond shape. You may use printf statements that print either a single asterisk (*) or a single blank. Maximize your use of repetition (with nested for statements) and minimize the number of printf statements.

2. Write a program to compute the power loss in a transmission line with a resistance of 0.05 ohms/mile. Compute the power loss if 500 kW of power is transmitted from a power generating station to cities at distance of 20,30,40,….100 miles at 100 V and 200 V.

   Current I = power transmitted / volts transmitted
   Resistance R = r * miles where r is resistance per mile
   Power loss = i^2 * R.

3. Given three corner points of a rectangle, and one more point P. Write a program to check whether P lies within the rectangle or not.
4. Write a program to read a number from the user and print the histogram of number of occurances of each digit in the number
5. Write a program that prints the arithmetic mean and the geometric mean of a given list of numbers

Set 10

1. Write a ‘c’ program using loops to create the following pattern:

```
$ * * * $
* $     $ *
*     $     *
* $     $ *
$ * * * $
```

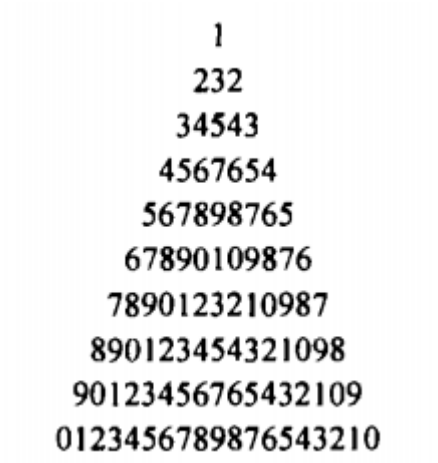
2. Super-Duper micros currently sell 100 Super-Dupers per month at a profit of Rs.500/- per Super-Duper. They have a fixed operating cost of Rs 10,000/- that does not depend on the volume of sales. They currently spend Rs.1000 /- per month on advertising. A marketing consultant advised them that if they double the amount spent on advertising, sales will increase by 20%. Write a ‘c’ program that begins with the company’s current status, and successively doubles the amount spent on advertising until the net profit begins to decline. Have the program print the number of Super-Duper sales, the advertising budget, and the net profit just before the profit begins to decline.
3. The equation $x^2 + y^2 = r^2$ represents a circle with center at origin and radius r. Write a ‘c’ program that reads r from the key board and prints the number of points with integer coordinates that lie within the circle.

   Sample Run:
   Enter the radius of the circle: 4
   No. of points inside the circle = 49

4. A computer aided design program expects users to enter the coordinate’s two corners of figures (Rectangle & Square). The coordinates of each corner is entered as a pair of integers, first the X coordinate and then the Y coordinate. Write a program that repeatedly calculates and writes out the height, the width, the perimeter and the area of the chosen figure until the user presses ‘q’. Note: The user can enter the corners in any order. Height and width are always positive (the program will have to adjust its calculations so that this is true.)
5. Write a program to read a positive number and perform the squares of individual digits.

Set 11

1. Generate the following "pyramid' of digits, using nested loops:



2. A fixed percentage of water is taken from a well each day. Input the values for w and p where w represents the amount in liters of water in the well at the start of the first day and p represents the percentage of the water in the well taken out each day. Write a program to print the number of the day, the amount taken for that day and the amount remaining in the well at the end of the day. The output should be terminated when 30 days have been printed or the amount of water remaining is less than 100 liters, whichever comes first.
3. A certain drug loses 4% of its effectiveness every month it is in storage. When its effectiveness is below 50% it is considered expired and must be discarded. Write a program that determines how many months the drug can remain in storage along with the names of the months, given the month of manufacture of drug.
4. Given that '20 root 12' can be represented as 'a root b'. Write a C program that finds the sum of all possible products ab?
5. Here is an ecological simulation of wolf and rabbit population. Rabbits eat grass. Wolves eat rabbits. There is plenty of grass, so wolves are the only obstacle to the rabbit population increase. The wolf population increases with the population of rabbits. The day by day change in the rabbit population R and the wolf population W can be expressed by the following formulae:

   R(tomorrow) = (1+a).R(today)-c.R(today).W(today)

   W(tomorrow) = (1-b).W(today)+c:d.R(today).W(today)

   A=0.01 = fractional increase in rabbit population without threat from wolves (0.01 means 1 % increase)

   B = 0.005 = fractional decrease in wolf population without rabbit to eat.

   C= 0.00001 = likelihood that a wolf will encounter and cat a rabbit.

D=0.01 = fractional increase in wolf population attributed to a devoured rabbit.

Assume that initially there are 10,000 rabbits and 1000 wolves. Write a program to calculate populations of rabbits and wolves over a 1000-day period. Have the program print the populations every 25 days. See what happens when you start with 500 wolves instead of 1000. Try starting with 2000 wolves too.