BASIC PROGRAMS

1. Write a Python program to count the number of carry operations for each addition problem.
According to Wikipedia “In elementary arithmetic, a carry is a digit that is transferred from one column of digits to another column of more significant digits. It is part of the standard algorithm to add numbers together by starting with the rightmost digits and working to the left. For example, when 6 and 7 are added to make 13, the "3" is written to the same column and the "1" is carried to the left".

2. Write a Python program to find the heights of the top three buildings in descending order from eight given buildings.
Input:
0 <= height of building (integer) <= 10,000
Input the heights of eight buildings:
25
35
15
16
30
45
37
39
Heights of the top three buildings:
45
39
37

3. Write a Python program to compute the digit number of the sum of two given integers.
Input:
Each test case consists of two non-negative integers x and y which are separated by a space in a line.
0 <= x, y <= 1,000,000
Input two integers (a b):
5 7
Sum of two integers a and b.:
2

4. Write a Python program to check whether three given lengths (integers) of three sides form a right triangle. Print "Yes" if the given sides form a right triangle otherwise print "No".

Input:
Integers separated by a single space.
1 <= length of the side <= 1,000
Input three integers (sides of a triangle)
8 6 7
No

5. Write a Python program which solve the equation:
Ax + By=C
Dx + Ey = F
Print the values of x, y where a, b, c, d, e and f are given.

Input:
a, b, c, d, e, f separated by a single space.
(-1,000 <= a, b, c, d, e, f<= 1,000)
Input the value of a, b, c, d, e, f:
5 8 6 7 9 4
Values of x and y:
-2.000 2.000

6. Write a Python program to compute the amount of debt in n months. Each month, the loan adds 5% interest to the $100,000 debt and rounds to the nearest 1,000 above.

Input:
An integer n (0 <= n <= 100)
Input number of months: 7
Amount of debt: $144000

7. Write a Python program that reads an integer n and finds the number of combinations of a,b,c and d (0 = a,b,c,d = 9) where (a + b + c + d) will be equal to n.

Input:
n (1 <= n <= 50)
Input the number (n): 15
Number of combinations: 592

8. Write a Python program to print the number of prime numbers that are less than or equal to a given number.

Input:

n (1 <= n <= 999,999)
Input the number (n): 35
Number of prime numbers which are less than or equal to n.: 11

9. Write a program to compute the radius and the central coordinate (x, y) of a circle which is constructed from three given points on the plane surface.

Input:
x1, y1, x2, y2, x3, y3 separated by a single space.
Input three coordinate of the circle:
9 3 6 8 3 6
Radius of the said circle:
3.358
Central coordinate (x, y) of the circle:
6.071 4.643

10. Write a Python program to check if a point (x,y) is in a triangle or not. A triangle is formed by three points.

Input:
x1, y1,x2,y2,x3,y3,xp,yp separated by a single space.
Input three coordinate of the circle:
9 3 6 8 3 6
Radius of the said circle:
3.358
Central coordinate (x, y) of the circle:
6.071 4.643

11. Write a Python program to compute and print the sum of two given integers (greater or equal to zero). In the event that the given integers or the sum exceed 80 digits, print "overflow".

Input first integer:
25
Input second integer:
22
Sum of the two integers: 47

12. Write a Python program that accepts six numbers as input and sorts them in descending order.
Input:

Input consists of six numbers n1, n2, n3, n4, n5, n6 (-100000 <= n1, n2, n3, n4, n5, n6 <= 100000). The six numbers are separated by a space.
Input six integers:
15 30 25 14 35 40
After sorting the said integers:
40 35 30 25 15 14

13. Write a Python program to test whether two lines PQ and RS are parallel. The four points are P(x1, y1), Q(x2, y2), R(x3, y3), S(x4, y4).
Input:
x1,y1,x2,y2,x3,y3,xp,yp separated by a single space
Input x1, y1,x2,y2,x3,y3,xp,yp:
2 5 6 4 8 3 9 7
PQ and RS are not parallel

14. There are two circles C1 with radius r1, central coordinate (x1, y1) and C2 with radius r2 and central coordinate (x2, y2).
Write a Python program to test the followings -
"C2 is in C1" if C2 is in C1
"C1 is in C2" if C1 is in C2
"Circumference of C1 and C2 intersect" if circumference of C1 and C2 intersect
"C1 and C2 do not overlap" if C1 and C2 do not overlap and
"Circumference of C1 and C2 will touch" if C1 and C2 touch

Input:
Input numbers (real numbers) are separated by a space.
Input x1, y1, r1, x2, y2, r2:
5 4 2 3 9 2
C1 and C2 do not overlap
Input x1, y1, r1, x2, y2, r2:
5 4 3 5 10 3
Circumference of C1 and C2 will touch
Input x1, y1, r1, x2, y2, r2:
6 4 3 10 4 2
Circumference of C1 and C2 intersect
Input x1, y1, r1, x2, y2, r2:
5 4 3 5 4 2
C2 is in C1
Input x1, y1, r1, x2, y2, r2:
5 4 2 5 4 3
C1 is in C2

15. Write a Python program that reads a date (from 2016/1/1 to 2016/12/31) and prints the day of the date. Jan. 1, 2016, is Friday. Note that 2016 is a leap year.

Input:
Two integers m and d separated by a single space in a line, m ,d represent the month and the day.
Input month and date (separated by a single space):
5 15
Name of the date: Sunday

16. Write a Python program that reads the two adjoining sides and the diagonal of a parallelogram and checks whether the parallelogram is a rectangle or a rhombus.
According to Wikipedia-
Parallelograms: In Euclidean geometry, a parallelogram is a simple (non-self-intersecting) quadrilateral with two pairs of parallel sides. The opposite or facing sides of a parallelogram are of equal length and the opposite angles of a parallelogram are of equal measure.
Rectangles: In Euclidean plane geometry, a rectangle is a quadrilateral with four right angles. It can also be defined as an equiangular quadrilateral, since equiangular means that all of its angles are equal (360°/4 = 90°). It can also be defined as a parallelogram containing a right angle.
Rhombus: In plane Euclidean geometry, a rhombus (plural rhombi or rhombuses) is a simple (non-self-intersecting) quadrilateral whose four sides all have the same length. Another name is equilateral quadrilateral, since equilateral means that all of its sides are equal in length. The rhombus is often called a diamond, after the diamonds suit in playing cards which resembles the projection of an octahedral diamond, or a lozenge, though the former sometimes refers specifically to a rhombus with a 60° angle, and the latter sometimes refers specifically to a rhombus with a 45° angle.

Input:
Two adjoined sides and the diagonal.
1 <= ai, bi, ci <= 1000, ai + bi > ci
Input two adjoined sides and the diagonal of a parallelogram (comma separated):
3, 4,5
This is a rectangle.

17. Write a Python program which accepts an even number (>=4, Goldbach number) from the user and creates combinations which express the given number as a sum of two prime numbers. Print the number of combinations.
Goldbach number: A Goldbach number is a positive even integer that can be expressed as the sum of two odd primes.[4] Since four is the only even number greater than two that requires the even prime 2 in order to be written as the sum of two primes, another form of the statement of Goldbach's conjecture is that all even integers greater than 4 are Goldbach numbers.

The expression of a given even number as a sum of two primes is called a Goldbach partition of that number.
The following are examples of Goldbach partitions for some even numbers:
6 = 3 + 3
8 = 3 + 5
10 = 3 + 7 = 5 + 5
12 = 7 + 5
...
100 = 3 + 97 = 11 + 89 = 17 + 83 = 29 + 71 = 41 + 59 = 47 + 53
Input an even number (0 to exit):
100
Number of combinations:
6

18. If you draw a straight line on a plane, the plane is divided into two regions. For example, if you draw two straight lines in parallel, you get three areas, and if you draw vertically one to the other you get 4 areas.
Write a Python program to create the maximum number of regions obtained by drawing n given straight lines.
Input:
(1 <= n <= 10,000)
Input number of straight lines (o to exit):
5
Number of regions:
16

19. There are four different points on a plane, P (xp,yp), Q(xq, yq), R(xr, yr) and S(xs, ys). Write a Python program to determine whether AB and CD are orthogonal.
Input:
xp,yp, xq, yq, xr, yr, xs and ys are -100 to 100 respectively and each value can be up to 5 digits after the decimal point It is given as a real number including the number of. Output:
Output AB and CD are not orthogonal! or AB and CD are orthogonal!.

There are 10 vertical and horizontal squares on a plane. Each square is painted blue and green. Blue represents the sea, and green represents the land. When two green squares are in contact with the top and bottom, or right and left, they are said to be ground. The area created by only one green square is called "island". For example, there are five islands in the figure below.
Write a Python program to read the mass data and find the number of islands.

Input:

Input 10 rows of 10 numbers representing green squares (island) as 1 and blue squares (sea) as zeros
1100000111
1000000111
0000000111
0010001000
0000011100
0000111110
0001111111
1000111110
1100011100
1110001000
Number of islands:
5

20. A convex polygon is a simple polygon in which no line segment between two points on the boundary ever goes outside the polygon. Equivalently, it is a simple polygon whose interior is a convex set. In a convex polygon, all interior angles are less than or equal to 180 degrees, while in a strictly convex polygon all interior angles are strictly less than 180 degrees.
Write a Python program that compute the area of the polygon. The vertices have the names vertex 1, vertex 2, vertex3,…. vertex n according to the order of edge connections
Note: The original sentences are uppercase letters, lowercase letters, numbers, symbols, less than 100 letters, and consecutive letters are not more than 9 letters.

Input:
Input number of sides: 5
Side: 1
Input the Coordinate:
Input Coordinate x: 1
Input Coordinate y: 0
Side: 2
Input the Coordinate:
Input Coordinate x: 0
Input Coordinate y: 0
Side: 3
Input the Coordinate:
Input Coordinate x: 1
Input Coordinate y: 1
Side: 4
Input the Coordinate:
Input Coordinate x: 2
Input Coordinate y: 0
Side: 5
Input the Coordinate:

Input Coordinate x: -1
Input Coordinate y: 1
Area of the Polygon: 0.5

21. Write a Python program to check whether a given integer is a palindrome or not.
Note: An integer is a palindrome when it reads the same backward as forward. Negative numbers are not palindromic.

Sample Input:
(100)
(252)
(-838)
Sample Output:
False
True
False