

Programming in Python (CSE 3142)

MINOR ASSIGNMENT-3: CONTROL STRUCTURES

1. Write an assignment statement using a single conditional expression for the following if-else code:
if marks \geq 70:
 remarks = 'good'
else:
 remarks = 'average'
2. It is commonly said that one human year is equivalent to 7 dog years. However, this simple conversion must recognize that dogs reach adulthood in approximately two years. As a result, some people believe that it is better to count each of the first two human years as 10.5 dog years and then count each additional human year as 4 dog years. Write a program that implements the conversion from human to dog years described in the previous paragraph. Ensure that your program works correctly for conversions of less than two human years and conversions of two or more human years. Your program should display an appropriate error message if the user enters a negative number.
3. The length of a month varies from 28 to 31 days. Create a program that reads the month's name from the user as a string. Then your program should display the number of days in that month. Display "28 or 29 days" for February so that leap years is addressed.
4. A roulette wheel has 38 spaces on it. Of these spaces, 18 are black, 18 are red, and two are green. The green spaces are numbered 0 and 00. The red spaces are numbered 1, 3, 5, 7, 9, 12, 14, 16, 18, 19, 21, 23, 25, 27, 30 32, 34 and 36. The remaining integers between 1 and 36 are used to number the black spaces. Many different bets can be placed in roulette. We will only consider the following subset of them in this exercise:
 - Single number (1 to 36, 0, or 00)
 - Red versus Black
 - Odd versus Even (Note that 0 and 00 do not pay out for even)
 - 1 to 18 versus 19 to 36

Write a program that simulates a spin of a roulette wheel by using Python's random number generator. Display the number that was selected and all of the bets that must be payed. For example, if 13 is selected then your program should display:

The spin resulted in 13...

Pay 13

Pay Black

Pay Odd

Pay 1 to 18

If the simulation results in 0 or 00 then your program should display Pay 0 or Pay 00 without any further output

5. The following table lists the sound level in decibels for several common noises. Write a program that reads a sound level in decibels from the user. If the user enters a decibel level that matches one of the noises in the table then your program should display a message containing only that noise. If the user enters a number of decibels between the noises listed then your program should display a message indicating which noises the value is between. Ensure that your program also generates reasonable

output for a value smaller than the quietest noise in the table, and for a value larger than the loudest

Noise	Decibel Level
Jackhammer	130dB
Gas Lawnmower	106 dB
Alarm Clock	70 dB
Quiet Room	40 dB

noise in the table.

6. Write a python script to assign a grade to a student based on marks obtained as per the criteria mentioned in the above table:

Range	Grade
marks \geq 90 and \leq 100	A
marks \geq 70 and \leq 89	B
marks \geq 50 and \leq 69	C
marks \geq 40 and \leq 49	D
marks \geq 0 and \leq 39	F

7. Study the program segments given below. In each case, give the output produced, if any.

- a. `total = 0`
`count = 20`
`while count > 5:`
`total += count`
`count -= 1`
`print(total)`
- b. `total = 0`
`N = 5`
`for i in range(1, N+1):`
`for j in range(1, i+1):`
`total += 1`
`print(total)`
- c. `total = 0`
`N = 10`
`for i in range(1, N+1):`
`for j in range(1, i+1):`
`total += 1`
`print(total)`
- d. `total = 0`
`N = 5`
`for i in range(1, N+1):`
`for j in range(1, i+1):`
`total += 1`
`total -= 1`
`print(total)`
- e. `total = 0`
`N = 5`
`for i in range(1, N+1):`
`for j in range(1, N+1):`

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        total += i
    print(total)
f. total = 0
   N = 5
   for i in range(1, N+1):
       for j in range(1, i+1):
           total += j
   print(total)
g. total = 0
   N = 5
   for i in range(1, N+1):
       for j in range(1, N+1):
           total += i+j
   print(total)
h. total = 0
   N = 5
   for i in range(1, N+1):
       for j in range(1, i+1):
           for k in range(1, j+1):
               total += 1
   print(total)
i. number = 72958476
   a, b = 0, 0
   while (number > 0):
       digit = number % 10
       if(digit % 2 != 0):
           a += digit
       else:
           b += digit
       number /= 10
   print(a,b)

```

8. Write a function to determine whether a given natural number is perfect. A natural number is said to be a perfect number if it is the sum of its divisors. For Example, 6 is a perfect number because $6 = 1+2+3$, but 15 is not because $15 \neq 1+3+5$.
9. Write a program to find the maximum of three numbers using a nested function.
10. Write a function that takes two numbers as input parameters and returns their least common multiple.
11. Write a function that takes two numbers as input parameters and returns their greatest common divisor.
12. Write a function that accepts as an input parameter the number of rows to be printed and prints a figure like:

(a) 1 1 2 1 2 3 1 2 3 4 1 2 3 4 5	(b) 1 2 1 2 3 2 1 2 3 4 3 2 1 2 3 4
(c) 5 4 3 2 1 4 3 2 1 3 2 1 2 1 1	(d) 1 2 2 3 3 3 4 4 4 4 5 5 5 5 5
(e) 1 2 3 4 5 2 3 4 5 3 4 5 4 5 5	(f) *
(g) *	(h) * * * * * * * * * * * * *
(i) *	(j) *
(k) *	(l) * * * * * * * * * * * * * * *
(m) \$	(n) #



13. Write a function that finds the sum of the n terms of the following series:

a.

$$1 - x^2/2! + x^4/4! - x^6/6! + \dots x^n/n!$$

b.

$$e^x = 1 + x/1! + x^2/2! + x^3/3! + \dots$$

14. Write a function that returns True or False depending on whether the given number is a palindrome.

15. Write a function that returns the sum of digits of a number, passed to it as an argument.

16. Write a program that prints Armstrong numbers in the range 1 to 1000. An Armstrong number is a number whose sum of the cubes of the cubes of the digits is equal to the number itself. For Example,

$$370 = 3^3 + 7^3 + 0^3$$

17. Write a function that takes two numbers as input parameters and returns True or False depending on whether they are co-primes. Two numbers are said to be co-prime if they do not have any common divisor other than one.
18. Write a function to multiply two non-negative numbers by repeated addition, for example, $7*5 = 7+7+7+7+7$.
19. Write a program that computes the average of a collection of values entered by the user. The user will enter 0 as a sentinel value to indicate that no further values will be provided. The program should display an appropriate error message if the first value entered by the user is 0
20. A particular retailer is having a 60 percent off sale on a variety of discontinued products. The retailer would like to help its customers determine the reduced price of the merchandise by having a printed discount table on the shelf that shows the original prices and the prices after the discount has been applied. Write a program that uses a loop to generate this table, showing the original price, the discount amount, and the new price for purchases of \$4.95, \$9.95, \$14.95, \$19.95 and \$24.95. Ensure that the discount amounts and the new prices are rounded to 2 decimal places when displayed.
21. Write a program that reads an integer from the user. If the value entered by the user is less than 2 then your program should display an appropriate error message. Otherwise, your program should display the prime numbers that can be multiplied together to compute n, with one factor appearing on each line. For example:
Enter an integer (2 or greater): 72
The prime factors of 72 are:
2
2
2
3
3