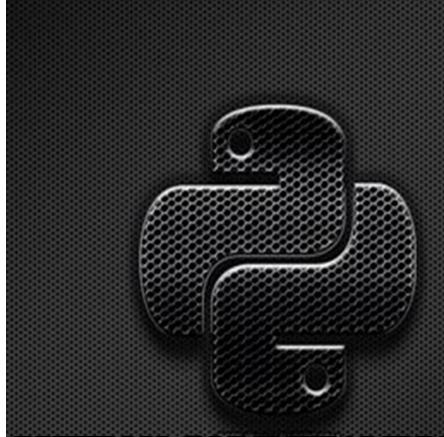# PYTHON CODE EXAMPLES -1
SOLVED EXERCISES TO PRACTICE

ABRAHAM ZUZA

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SOLVED EXERCISES TO PRACTICE

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Python Code Examples

Abraham Zuza
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HOW TO USE THIS BOOK

This book is for beginners. I thought about making it available because on my journey in search of learning Python I found a lot of theory, but I was not very successful in finding examples of code that I could study.

I did not intend to bring any theory to this ebook, just practical examples through solved exercises. I believe that learning in practice is a good way too. However, it is necessary to distinguish between open scope problems and closed scope problems. Since the 90 exercises in this ebook contain the respective solutions, they end up being closed-scope problems, as they bring a strategy ready for you to follow and seek to understand.

And this is how I would like this book to serve you: as a way for you to analyze the codes that are here, and then move on to solving open-scope problems, which are those that do not bring solutions or define strategies, since you, full of knowledge, will be able to do that!

Good journey, and good learning.

PYTHON VARIABLES
Numeric type, float type, Boolean type, string type and variable scope

EXAMPLE 1

Make a program that reads a number and prints it

```
num = int(input('Type a number '   ))
print('The number you entered is ', num)
```

EXAMPLE 2

Ask the user to type three integers values and print their sum
```
value1 = int(input('Type a number '   ))
value2 = int(input('Type a number '   ))
```

```
value3 = int(input('Type a number '   ))
print('The sum of the numbers you entered is ', value1+value2+value3)
```

EXAMPLE 3

Read a temperature in Celsius and print is converted to Fahrenheit. The conversion formula is F = C * (9.0/5.0) + 32.0, where F is the Fahrenheit temperatura and C is the Celsius temperature.

```
celsius = int(input('Type the temperature in Celsius '   ))
fahr = celsius*(9/5)+32
print(celsius, 'converted to Fahrenheit is ', fahr, 'Fahrenheit')
```

EXAMPLE 4

Read a temperature in Fahrenhei and print it converted to Celsius. The conversion formula is C = 5.0 * (F -32.0)/ 9.0, where C is the Celsius temperature, and F is the Fahrenheit temperature.

```
fahr = int(input('Type the temperature in Fahrenheit '   ))
celsius = 5*(fahr-32)/9
print(fahr, 'converted in celsius is', celsius, 'Celsius')
```

EXAMPLE 5

Read a temperature in Kelvin, and print it converted in Celsius. The conversion formula is C = K – 273.15, where C is Celsius temperature and K is Kelvin temperature.

```
kelvin = int(input('Type the temperature in Kelvin '   ))
celsius = kelvin-273.15
print(kelvin, 'converted to Celsius is ', celsius, 'Celsius')
```

EXAMPLE 6

Read a temperature in Celsius, and print it converted in Kelvin. The conversion formula is K = C + 273.15, where C is Celsius temperature, and K is Kelvin temperature.

```
celsius = int(input('Type the temperature in Celsius '   ))
kelvin = celsius + 273.15
print(celsius, 'converted to Kelvin is ', kelvin, 'Kelvin')
```

EXAMPLE 7

Read a velocity in km/h (kilometers per hour) and print it converted to m/s (meters per second). Conversion formula is M = K / 3.6, where K is the velocity in km/h and M in m/s.

```
kmh = int(input('Type the velocity in Km/h '   ))
mts = kmh /3.6
print(kmh, 'converted in m/s is ', mts, 'meters per second')
```

EXAMPLE 8

Read a velocity in m/s (meters per second) and print it converted to km/h (kilometers per hour). Conversion formula is K = M * 3.6, where K is the velocity in km/h and M in m/s.

```
mts = int(input('Type the velocity in m/s '   ))
kmh = mts * 3.6
print(mts, 'converted in km/h is ', kmh, 'kilometers per hour'')
```

EXAMPLE 9

Read a distance in miles and print it converted to kilometers. Conversion formula os is K = 1.61 * M, where K is the distance in kilometers and M in miles.

```
mls = int(input('Type the distance in miles '   ))
km = mls * 1.61
print(mls, 'miles converted to kilometers is ', km, 'kilometers')
```

EXAMPLE 10

Read a distance in kilometers and print it converted to miles. Conversion formula is M = K / 1.61, where K is the distance in kilometers and M in miles.

```
km = int(input('Type the distance in kilometers '   ))
mls = km / 1.61
print(km , 'kilometers converted in miles equals ', mls, 'miles')
```

EXAMPLE 11

Read an angle in degrees and print it converted to radians. Conversion formula is R = G * π / 180, where G is the angle in degrees and R in radians, and π = 3.14

```
ang = float(input('Type the angle in degrees '   ))
rad = ang * (3.14/180)
print(ang, 'degrees equals ', rad, 'radians')
```

EXAMPLE 12

Read an angle in radians and print it converted to degress. Conversion formula is G = R *180/π, where G is the angle in degrees and R in radians, and π = 3.14

```
rad = float(input('Tye the angle in radians '   ))
ang = rad * (180/3.14)
print(rad, 'radians equals ', ang, 'degrees')
```

EXAMPLE 13
Read a length value in inches and have it converted to centimeters. The conversion formula is: C = P * 2.54, with C being the length in centimeters and P being the length in inches.

```
inch = float(input('Enter a value in inches ' ))
cent = inch * 2.54
print(inch, 'equals to ', cent, 'centímeters')
```

EXAMPLE 14
Read a length value in centimeters and have it converted to inches. The conversion formula is: P = C / 2.54, where C is the length in centimeters and P is the length in inches

```
cent = float(input('Enter a value in centimeters '   ))
inch = cent / 2.54
print(cent, 'centrímeters equals to', inch, 'inches')
```

EXAMPLE 15

Read the value of a volume in cubic meters m ^{3} and present it converted into liters. The conversion formula is L = 1000 * M, where L is the volume in liters and M is the volume in cubic meters

```
M = float(input('Enter a volume in cubic meters '   ))
L = M * 1000
```

print(M, 'cubic meters equals to ', L, 'liters')

EXAMPLE 16

Read a volume value in liters and present it converted to cubic meters m^3 . The conversion formula is: M = L / 1000, where oL is the volume in liters and M is the volume in cubic meters.

```
L = float(input('Type a volume in liters  '  ))
M = L / 1000
print(L, 'liters equals to ', M, 'cubic meters')
```

EXAMPLE 17

Read a mass value in kilograms and display it converted to pounds. The conversion formula is: L = K / 0.45, where K is the mass in kilograms and L is the mass in pounds

```
kg = float(input('Enter a value in kilograms '   ))
pound = kg / 0.45
print(kg, kilograms equals to', pound, 'pounds')
```

EXAMPLE 18
Read a mass value in pounds and display it converted to kilograms. The conversion formula is K = L * 0.45, where K is the mass in kilograms and L is the mass in pounds.

```
pound = float(input('Enter a value in pounds '   ))
kg = pound * 0.45
print(pound, 'pounds equals to', kg, 'kilograms')
```

EXAMPLE 19
Read a length value in yards and display it converted to meters. The conversion formula is M = 0.91 * J, where J is the length in yards and M is the length in meters.

```
yard = float(input('Enter a lenght in yards '   ))
met = yard * 0.91
print(yard, 'yards equals to ', met, 'metros')
```

EXAMPLE 20
Read a length value in meters and display it converted to yards. The conversion formula is J = M / 0.91, J being the length in yards and M the length in meters.

```
met = float(input('Enter a lenght in meters '  ))
yard = met / 0.91
print(met, 'meters equals to ', yard, 'yards')
```

EXAMPLE 21
Read an area value in square meters m2 and present it converted to acres. The conversion formula is: A = M * 0.000247, where M is the area in square meters and A is the area in acres.

```
armet = float(input('Enter an area in square meters '  ))
ac = armet * 0.000247
print(armet, 'square meters equals to ', ac, 'acres')
```

EXAMPLE 22
Read an area value in acres and present it converted into square meters m2. The conversion formula is M = A * 4048.58, where M is the area in square meters and A is the area in acres.

```
ac = float(input('Enter an area in acres '  ))
armet = ac*4048.58
print(ac, 'acres equals to ', armet, 'square meters')
```

EXAMPLE 23
Read an area value in square meters (m^2) and present it converted into hectares. The conversion formula is H = M * 0.0001, where M is the area in square meters and H is the area in hectares.

```
sqm = float(input('Enter an area in square meters '  ))
hec = sqm*0.0001
print(sqm, 'square meters equals to ', hec, 'hectares')
```

EXAMPLE 24
Read an area value in hectares and present it converted into square meters m2. The conversion formula is M = H * 10000, where M is the area in square meters and H is the area in hectares.

```
hec = float(input('Enter an area in hectares '  ))
```

```
sqm = hec*10000
print(hec, 'hectares equals to ', sqm, 'square meters')
```

EXAMPLE 25
Read three values and display the sum of the squares of the three values read as a result.

```
value1 = float(input('Enter the first value '  ))
value2 = float(input('Enter the second value '   ))
value3 = float(input('Enter the third value '  ))
value4 = value1**2
value5 = value2**2
value6 = value3**2
print('The result of the sum of the square of the three entered values is ',
value4+value5+value6)
```

EXAMPLE 26
Read four exam grades, calculate the arithmetic average grade and print the result.

```
grade1 = float(input('Enter the first grade '  ))
grade2 = float(input('Enter the second grade '  ))
grade3 = float(input('Enter the third grade '  ))
grade4 = float(input('Enter the fourth grade '  ))
avgrade = (grade1+grade2+grade3+grade4)/4
print('The arithmetic average grade of the four grades is ', avgrade)
```

EXAMPLE 27
Read an integer and print its predecessor and successor

```
integer = float(input('Enter an integer number '  ))
predecessor = integer - 1
successor = integer + 1
print('The predecessor number is ', predecessor,
          'and the successor number is ', successor)
```

EXAMPLE 28
Read an integer and print the sum of your triple's successor and your double's predecessor.

```
integer = float(input('Enter an integer number '))
```

```
tri = (integer*3)+1
dob = (integer*2)-1
print(tri, dob)
print('The sum of the successor of the triple of'
        'this integer number with the predecessor of its doble is ', tri+dob)
```

EXAMPLE 29
Read the size of the side of a square and print it's area as a result.

```
side = float(input('Enter the square side '))
area = side**2
print('The square area is ', area)
```

EXAMPLE 30
Read the radius value of a circle and calculate and print the area of the corresponding circle. The area of the circle is pi * radius2, consider pi = 3.141592

```
radius = float(input('Enter the radius of the circle '))
pi = 3.141592
area = pi*(radius**2)
print('The circle area is ', area)
```

EXAMPLE 31
Let a and b be the sides of a triangle, where the hypotenuse is obtained by the equation: hypotenuse $= \sqrt{(a^2 + b^2)}$. Make a program that receives the values of a and b and calculate the value of the hypotenuse using the equation. Print the result of this operation.

```
a = float(input('Enter the value of the A side '))
b = float(input('Enter the value of the B side '))
hypotenuse = ((a**2)+(b**2))**(1/2)
print('The hypotenuse is ', hypotenuse)
```

EXAMPLE 32
Read the height and radius of a circular cylinder and print the cylinder volume. The volume of a circular cylinder is calculated using the following formula: V = pi * radius2 * height, where pi = 3.141592

```
height = float(input('Enter the height of the cylinder '))
radius = float(input('Enter the radius of the cylinder '))
pi = 3.141592
```

```
volume = pi*height*radius**2
print('The volume of this cylinder is ', volume)
```

EXAMPLE 33

Make a program that reads the value of a product and prints the value with a discount, considering that the discount was 12%.

```
value = float(input('Enter the value of the product ' ))
discount = 0.88
print('The product with descount is ', value*discount)
```

EXAMPLE 34

Read an employee's salary. Calculate and print the value of the new salary, knowing that it received a 25% increase.

```
salary = float(input('Enter the salary '))
increase=1.25
print('The salary value, with increase, will be ', salary*increase)
```

EXAMPLE 35

The amount of USD 780,000.00 will be divided between three contest winners, according to the following rules:
The first winner will receive 46%
The second will receive 32%
The third party will receive the rest.
Calculate and print the amount won by each player.

```
prize = 780000
winner1 = prize*0.46
winner2 = prize*0.32
winner3 = prize - (winner1 + winner2)
print('The first winner will receive ', winner1,
        'The second winner will receive ', winner2,
        'The third winner will receive', winner3)
```

EXAMPLE 36

A company hires a plumber at R $ 30.00 per day. Make a program that requests the number of days worked by the plumber and print the net amount that must be paid, knowing that 8% are deducted for income tax.
```
days = float(input('Enter the amount of working days '))
salary = 30
incometax= 0.92
```

```
grosssalary = days*salary
deducted = grosssalary*0.08
liquidsalary = (days*salary)*incometax
print('The gross salary is ', grosssalary,
        'The Income Tax deduction is ', deducted,
        'The liquid salary will be ', liquidsalary)
```

Make a program that reads the value of the worked hour and the number of worked hours in the month. Print the amount to be paid to the employee, adding 10% over the calculated amount.

```
workedhours = float(input('Enter the amount of worked hours '))
hoursalary = float(input('Enter the value of the hour salary '))
grosssalary = hoursalary * workedhours
gratification = grosssalary * 0.1
print('The gross salary is ', grosssalary,
        'The gratification over the salary is ', gratification,
        'The salary will be ', grosssalary+gratification)
```

Receive an employee's base salary. Calculate and print the salary to be received, knowing that this employee has a 5% bonus on the base salary. In addition, he pays 7% base tax.

```
base = float(input('Enter the base salary '))
bonus = base*0.05
incometax = base * 0.07
grosssalary = base + bonus
liquidsalary = grosssalary - incometax
print('The base salary is ', base,
        'The bonus is ', bonus,
        'The income tax is ', incometax,
        'The liquid salary is ', liquidsalary)
```

Write a help program for salespeople. From a total value read, show:
Total payable at 10% discount
The seller's commission (5% on the discounted value)

```
value = float(input('Enter the product price '  ))
discount = value * 0.1
```

```
discountvalue = value - discount
comission = discountvalue * 0.05
print(' The discount is ', discount,
        'The price after discount is  ', discountvalue,
        "Seller's comission is ", comission)
```

EXAMPLE 40

Receive the height of the step of a ladder and the height that the user wants to reach by climbing the ladder. Calculate and show how many steps the user must climb to reach his goal.

```
step = float(input('Enter the height of the step in centimeters '  ))
heightgoal = float(input('Enter the height you want to climb in meters ' ))
goalconv = heightgoal * 100
print('To climb ', heightgoal, 'meters you will have to climb ',
        goalconv / step, 'steps')
```

EXAMPLE 41

Make a program to convert an uppercase letter to lowercase.

```
letter = str(input('What is the letter you want to convert? '))
print(letter.lower())
```

EXAMPLE 42

Make a program that reads a positive three-digit integer (from 100 to 999). Generate another number formed by the inverted digits of the number read. Example:
ReadNumber = 123
GeneratedNumber = 321

```
num = int(input('Enter a three digit number: '))
n = str(num)
print(n[::-1])
```

EXAMPLE 43

Read a 4-digit integer (from 1000 to 9999) and print one digit per line

```
num = int(input('Enter an integer number with four digit: '))
n = str(num)

print(f'First digit: {n[0]}')
```

```
print(f'Second digit: {n[1]}')
print(f'Third digit: {n[2]}')
print(f'Fourth digit: {n[3]}')
```

Read an integer value in seconds, and print it out in hours, minutes and seconds.

```
seconds = int(input("Enter an integer number in seconds: "))
minutes = (seconds / 60)
hours = (seconds / 3600)
print("{0} seconds, equals to {1} hours, {2} minutes and {3} seconds".format(seconds, hours, minutes, seconds))
```

Make a program that reads the start time (hour, minute and seconds) and the duration, in seconds, of a biological experiment. The program should result in the new time (hour, minute and second) at the end of the same.

```
hour = int(input('Enter the beginning hour:\n'))
minutes = int(input('Enter the beginning minutes:\n'))
seconds = int(input('Enter the beginning seconds:\n'))
print(f'You started at {hour} hours, {minutes} minutes and {seconds} seconds')
totalseconds = (hour * 3600) + (minutes * 60) + seconds
duration_seconds = int(input(f'Enter the duration in seconds: '))
total_duration_seconds = totalseconds + duration_seconds
print(total_duration_seconds)
final_hour = int(total_duration_seconds / 3600)
if final_hour > 24:
        real_hour = final_hour - 24
final_minutes = int((total_duration_seconds - (final_hour * 3600)) / 60)
final_seconds = total_duration_seconds % 60
print(f'You will finish it at {final_hour} hours,'
        f'{final_minutes} minutes, and {final_seconds} seconds')
```

Implement a program that calculates a person's year of birth from their age and the current year

```
year = int(input('How old are you? '))
print(f'You are {year} years old and was born in {2020 - year}.')
```

Write a program that reads the x and y coordinates of points in R2 and calculates their distance from the origin (0, 0)

```
x1 = 0.0
y1 = 0.0
x2 = float(input('Enter the x coordinate: '))
y2 = float(input('Enter the y coordinate: '))
r = (((x1 - x2) ** 2) + ((y1 - y2) ** 2)) ** 0.5
print(f'The distance is {r}')
```

EXAMPLE 48
Three friends played the lottery. If they win, the prize must be shared in proportion to the amount each gave to place the bet. Make a program that reads how much each bettor has invested, the value of the prize, and prints out how much each one would win from the prize based on the amount invested.

```
num1 = float(input('Bet of friend 1: '))
num2 = float(input('Bet of friend 2: '))
num3 = float(input('Bet of friend 3: '))
numtotal = num1 + num2 + num3

prize =  float(input('What is the value of the prize? '))

pernum1 = num1 / numtotal
pernum2 = num2 / numtotal
pernum3 = num3 / numtotal
print(' ')
print('The percentage of bettor 1 is ', pernum1)
print('The percentage of bettor 2 is ', pernum2)
print('The percentage of bettor 3 is ', pernum3 )
print('   ')
print(f'The bettor 1 invested ${num1} and won ${prize * pernum1}')
print(f'The bettor 2 invested ${num2} and won ${prize * pernum2}')
print(f'The bettor 3 invested ${num3} and won ${prize * pernum3}')
```

EXAMPLE 49
Make a program to read the dimensions of a land (length c, and width l), as well as the price of the meter of screen p. Print the cost to surround this same land with canvas.

```
l = float(input('How long is the terrain? '))
w = float(input('How wide is the terrain? '))
s = float(input('What is the price of the meter of the wire? '))
```

```
fp = l * w * s
```

print(f'The cost to surround this same land with a wire is ${fp:.2f}')

LOGICAL AND CONDITIONAL STRUCTURES
If, else, elif, and, or, not, is

EXAMPLE 1
Make a program that receives two numbers and shows which one is the largest.

```
n1 = int(input('Enter the first number ' ))
n2 = int(input('Enter the second number ' ))

largest = n1

if largest < n2:
        largest = n2

if largest > n2:
        largest = n1

print('The largest number is: %d ' %largest)
```

EXAMPLE 2
Read a number provided by the user. If that number is positive, calculate the square root of the number. If the number is negative, show a message saying the number is invalid.

```
import math

num1 = int(input('Enter a number ' ))

if num1 > 0 :
        print('The square root of this number is', math.sqrt(num1))
elif num1 < 0:
        print('Invalid number ')
```

EXAMPLE 3

Read a real number. If the number is positive, print the square root. Otherwise, print the number squared.

```
import math

num1= int(input('Enter a number ' ))

if num1 > 0:
     print("The square root of this number is", math.sqrt(num1))
elif num1< 0:
     print("The number to second power is", num1**2)
```

EXAMPLE 4
Make a program that reads a number and, if it is positive, calculate and show
- The number typed in the square
- The square root of the number entered.

```
import math

num1 = int(input('Enter a number ' ))

if num1 > 0:
     print('The number typed in the square is ', num1**2)
     print('The square root of the number is', math.sqrt(num1))
elif num1 < 0:
     print('Invalid number')
```

EXAMPLE 5
Make a program that receives an integer and check if this number is even or odd.

```
num1 = int(input('Enter a number ' ))
rest = num1 % 2

if rest == 0:
     print('The number is even')
else:
     print('The number is odd')
```

EXAMPLE 6
Write a program that, given two whole numbers, shows the largest one on the screen, as well as the difference between them.

```
num1 = int(input("Enter the first number " ))
```

```python
num2 = int(input("Enter the second number " ))
num3 = num1 - num2

if num1 > num2:
        print("The number ", num1, "is largest than ", num2)
elif num2 > num1:
        print("The number ", num2, "is largest than ", num1)

print(" The difference between the two numbers is ", num3)
```

EXAMPLE 7

Make a program that receives two numbers and shows the largest one. If by chance, the two numbers are the same, print the message "Equal numbers".

```python
n1 = int(input('First number ' ))
n2 = int(input('Second number ' ))

largest = n1

if largest < n2:
        print('The largest number is ', n2)


if largest > n2:
        print('The largest number is ', n1)


if n1 == n2:
        print('The numbers are equal')
```

EXAMPLE 8

Make a program that reads 2 grades from a student, check if the grades are valid and display the average of these grades on the screen. A valid grade must be a value between 0.0 and 10.0, where if the grade does not have a valid value, this fact must be informed to the user and the program ends.

```python
num1 = int(input('Enter the first grade ' ))
num2 = int(input('Enter the second grade ' ))

if num1 < 0 or num1 > 10 or num2 < 0 or num2 >10:
        print('Grades are invalid')
else:
        print('The average grade is ', (num1 + num2 )/2)
```

Read a worker's salary and the amount of a loan. If the installment is greater than 20% of the salary, print: "Loan not granted". Otherwise print: "Loan granted".

```python
salary = int(input('Enter the value of the salary ' ))
installment = int(input('Enter the installment value ' ))

value = salary * 0.20

if value > installment:
        print('Loan granted')
else:
        print('Loan not granted')
```

Make a program that receives the height and sex of a person and calculate and show their ideal weight, using the following formulas (where h, corresponds to height)

- Men: (72.7 * h) - 58
- Women (62.1 * h) - 44.7

```python
height = float(input('Enter your height ' ))
gender = str(input('Enter your gender, M for male, and F for female ' ))

if gender == 'M':
        man = (72.7 * height) - 58
        print('your ideal weight is ', (man))
elif gender == 'F':
        woman = (62.1 * height) - 44. 7
        print('your ideal weight is ', (woman))
else:
        print('Verify if the information were inserted correctly, and try again')
```

Write a program that reads an integer greater than zero and returns, on the screen, the sum of all its numbers. For example, the number 251 will correspond to the value 8 (2 + 5 + 1). If the number read is not greater than zero, the program will end with the message "Invalid number".

```python
while True:
        addition = 0
        numbers = str(input('Type a number: ' ))
        value_2 = int(numbers)
```

```
if value_2 > 0:
    for number in numbers:
        value = int(number)
        addition = addition + value
    print(f'The sum of these values is {addition}')
else :
    print('The number needs to be greater than zero' )
comand = input('Wanna go on? (y/n): ').upper()
if comand != 'Y':
    break
```

EXAMPLE 12

Read an integer. If the number read is negative, write the message "Invalid number". If it is positive, calculate the logarithm of this number.

```
import math

num1 = int(input('Enter a number ' ))

if num1 < 0:
    print('Invalid number')

else:
    print('The logarithm of the number is: ', math.log(num1,10))
```

EXAMPLE 13

Make an algorithm that calculates the weighted average of the scores of 3 tests. The first and second tests have a weight of 1 and the third has a weight of 2. At the end, show the student's average and indicate whether the student has passed or failed. The pass mark must be 60 points or more.

```
import math

grade1 = int(input('Enter the first grade: ' ))
grade2 = int(input('Enter the second grade: ' ))
grade3 = int(input('Enter the third grade: ' ))

average = (grade1 * 1 + grade2 * 1 + grade3 *2)/3

if average >= 6:
    print('The student passed with average grade ', average)
else:
    print('The student failed with average grade ', average)
```

EXAMPLE 14

The final grade of a student is calculated from three grades assigned between the range of 0 to 10, respectively, to a laboratory assignment, to a half-yearly evaluation and to a final exam. The average of the three grades mentioned above obeys the percentage: Laboratory work: 20%; half-yearly evaluation 30%: Final exam: 50%. According to the result, show on the screen whether the student will fail (average between 0 and 2.9), recovery (between 3 and 4.9) or if he passes. Make all necessary checks.

```python
laboratory_assignment = float(input("Enter the grade of the student's laboratory assignment: "))
half_yearly_evaluation = float(input("Enter the grade of the student's half_yearly_evaluation: "))
final_exam = float(input("Enter the grade of the student's final exam: "))


print()
if ((laboratory_assignment >= 0) and (laboratory_assignment <= 20)) and ((half_yearly_evaluation >= 0) and (half_yearly_evaluation <= 30)) and ((final_exam >= 0) and (final_exam <= 50)):

    average = (laboratory_assignment * 0.2 + half_yearly_evaluation * 0.3 + final_exam * 0.5 )
    print("The student's average grade is %.1f" % average)

    if (average >= 0) and (average <= 2.9):
        print("The student fail")

    elif (average >= 3) and (average <= 4.9):
        print("The student is in recovery")

    else:
        print("The student is approved")

else:
    print("Wrong grades entered")
    .
```

EXAMPLE 15

Using switch, write a program that reads an integer between 1 and 7 and prints the day of the week corresponding to this number. That is, Sunday if 1, second if 2, and so on. OBS: The switch is a conditional structure that does not exist in Python, but we can simulate it through pure logic, or even with functions, and/or using if and elif

```python
number = int(input("Enter a number referring to a day of the week: "))
```

```
print()
if (number >= 1) and (number <= 7):
        if number == 1:
            print("Sunday")

        elif number == 2:
            print("Monday")

        elif number == 3:
            print("Tuesday")

        elif number == 4:
            print("Wednesday")

        elif number == 5:
            print("Thursday")

        elif number == 6:
            print("Friday" )

        else:
            print("Saturday")

else:
        print("Invalid Day")
```

EXAMPLE 16
Using switch, write a program that reads an integer between 1 and 12 and prints the month corresponding to this number. That is, January if 1, February if 2 and so on.

```
number = int(input("Type a number referring to a month: "))

if (number >= 1) and (number <=12):
        if number == 1:
            print("January")

        elif number == 2:
            print("February" )

        elif number == 3:
            print("March")
```

```python
        elif number == 4:
            print("April")

        elif number == 5:
            print("May")

        elif number == 6:
            print("June")

        elif number == 7:
            print("July")

        elif number == 8:
            print("August")

        elif number == 9:
            print("September")

        elif number == 10:
            print("October" )

        elif number == 11:
            print("November")

        else:
            print("December")

else:
    print("Invalid Month")
```

EXAMPLE 17

Make a program that calculates and shows the area of a trapezoid. It is known that

$$A = \frac{(\text{major base} + \text{minor base}) * \text{height}}{2}$$

Remember that the major and minor bases must be numbers greater than zero.

```python
minor_base = float(input("Enter the minor base size of the trapezoid in centimeter: "))

major_base = float(input("Enter the major base size of the trapezoid in centimeter: "))

height = float(input("Enter the height of the trapezoid in centimeter: "))

print()
if (minor_base > 0) and (major_base > 0) and (height > 0):
```

```
            area = ((major_base + minor_base) * height) / 2
            print("The trapezoid area is %.1fcm²" % area)


        else:
            print("Invalid values")
```

EXAMPLE 18

Make a program that shows the user a menu with 4 options for mathematical operations (the basic ones, for example). The user chooses one of the options and his program then asks for two numeric values and performs the operation, showing the result and exiting.

```
        operation = input("Choose the mathematical operation ['*']['/']['+']['-']: ")

        num1 = int(input("Enter the first value: "))
        num2 = int(input("Enter the second value: "))

        print()
        if operation == '*':
            print(f"The result of this calculation is: {num1 * num2}")

        elif operation == '/':
            print(f"The result of this calculation is: {num1 / num2}")

        elif operation == '+':
            print(f"The result of this calculation is: {num1 + num2}")

        elif operation == '-':
            print(f"The result of this calculation is: {num1 - num2}")

        else:
            print("Invalid operation")
```

EXAMPLE 19

Make a program to verify that a given integer is divisible by 3 or 5, but not simultaneously by both.

```
        number = int(input("Digite um número: "))

        if number % 3 == 0 and not (number % 5 == 0):
            print("Divisible by 3.")

        elif number % 5 == 0 and not(number % 3 == 0):
```

```
        print("Divisible by 5.")

    else:
        print("Not divisible by 3 or 5 / Can't be divided by both ")
```

EXAMPLE 20

Given three values, A, B, C, check if they can be values on the sides of a triangle and, if they are, if it is a scalene triangle, equilateral or isosceles, considering the following concepts:

- The length of each side of a triangle is less than the sum of the other two sides.
- The triangle with three equal sides is called equilateral.
- The triangle that has the length of two equal sides and the third side is different is called isosceles.
- The triangle with the three different sides is called scalene.

```
a = float(input("Enter the value A of the triangle: "))
b = float(input("Enter the value A of the triangle: "))
c = float(input("Enter the value A of the triangle: "))

print()

if (a < (b + c)) and (b < (a + c)) and (c < (a + b)):
    if (a == b) and (a == c):
        print("Equilateral triangle!")

    elif ((a == b) and (a != c)) or ((a == c) and (a != b)) or ((b == c) and (b != a)):
        print("Isosceles triangle!")

    elif (a != b) and (a != c) and (b != c):
        print("Scalene triangle!")

    else:
        print("Error")

else:
    print("Not a triangle")
```

EXAMPLE 21

Type the option menu below. Read the user option and perform the chosen operation. Write an error message if the option is invalid.

Choose the option:
1 - Sum of 2 numbers

2 - Difference between 2 numbers (highest to lowest)
3 - Product between 2 numbers
4- Division between 2 numbers (the denominator cannot be zero)

```python
print("1 - Sum of two numbers.\n"
        "2 - Difference between 2 numbers (highest to lowest).\n"
        "3 - Product between 2 numbers.\n"
        "4 - Division between 2 numbers (the denominator cannot be zero).\n")

option = int(input("Choose the option: "))

print()
num1 = int(input("Enter the first number: "))
num2 = int(input("Enter the second number: "))

print()
if option == 1:
        print(f"The sum of the two numbers is: {num1 + num2}")

elif option == 2:
        if num1 >= num2:
                print(f"The difference between the two numbers is: {num1 - num2}")
        elif num1 >= num1:
                print(f"The difference between the two numbers is: {num2 - num1}")

elif option == 3:
        print(f"The product between the two numbers is: {num1 * num2}")

elif option == 4:
        if num2 != 0:
                print(f"Division between the two numbers is: {num1 / num2}")
        else:
                print("Denominator can't be zero!")

else:
        print("Invalid option!")
```

EXAMPLE 22
Read a worker's age and for how long he worked and write whether or not he can retire. The conditions for retirement are:
    - Be at least 65 years old
    - Or have worked at least 30 years
    - Or be at least 60 years old and have worked at least 25 years.

```python
age = int(input("Enter the age: "))
```

```python
worked_time = int(input("Enter the worked time (in years): "))

if (age >= 64) or (worked_time >= 30) or ((age >=60) and (worked_time >= 25)):
    print("The worker can retire!")

else:
    print("The worker can't retire!")
```

EXAMPLE 23

Determine whether a given year is leap year. A year is a leap year if it is divisible by 400 or if it is divisible by 4 and it is not divisible by 100. For example: 1988, 1992, 1996

```python
year = int(input("Enter a year: "))

print()
if (year % 400 == 0) or ((year % 4 == 0) and not (year % 100 == 0)):
    print("Leap year!")

else:
    print("Not a leap year!")
```

EXAMPLE 24

A company sells the same product to four different states. Each state has a different rate of tax on the product (WA 7%: NY 12%: RI 15%: TX 8%) Make a program in which the user enters the value and the destination state of the product and the program returns the final price of the product plus the state tax in which it will be sold. If the status entered is not valid, display an error message.

```python
value = float(input("Enter the product value: "))
state = input("Enter the federal state unit: ")

state = state.upper()

print()
if state == 'WA':
    print("The product price with applied tax: US$%.2f" % (value + (value * 0.07)))

elif state == 'NY':
    print("The product price with applied tax: US$%.2f" % (value + (value * 0.12)))

elif state == 'RI':
```

```
        print("The product price with applied tax: US$%.2f" % (value + (value *
0.15)))

    elif state == 'TX':
        print("The product price with applied tax: US$%.2f" % (value + (value *
0.08)))

    else :
        print("Invalid federal state unit!")
```

EXAMPLE 25

Calculate the roots of the 2nd degree equation: Remembering that:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Where $b^2 - 4ac$ is also called Δ

And $ax^2 + bx + c = 0$ represents the second degree equation. The variable a must be non-zero. If it is zero, print the message: "It is not a second degree equation".
- If Δ is less than 0, there is no real. Print the message "There is no real"
- If Δ is equal to 0, there is a real root. Print "Single root".
- If Δ is greater than or equal to 0, print the two real roots.

```
a = float(input("Enter the value of ax²: "))
b = float(input("Enter the value of bx: "))
c = float(input("Enter the value of c: "))

print()
if a != 0:
    delta = (b ** 2) - (4 * a * c )

    if delta < 0:
        print("There is no root!")

    elif delta == 0:
        x = -b / (2 * a)
        print(f"Single root is: {x}")

    else:
        x1 = (-b + delta ** 0.5) / 2 * a
        x2 = (-b - delta ** 0.5) / 2 * a
        print(f"The roots are {x1} e {x2}")

else:
    print("This is not a second degree equation.")
```

EXAMPLE 26
Read the distance in km and the quantity of liters of gasoline consumed by a car on a route, calculate the consumption in km/l and write a message according to the table below:

COMSUMPTION	(km/l)	MESSAGE
Less than	8	Sell the car
Between	8 and 12	Economic
More than	12	Super economical

```
distance = float(input("Enter the distance of the route in km: "))
gasoline = float(input("Enter the amount of liters of gasoline consumed on the route: "))

consumption = distance / gasoline

print()
if consumption < 8:
    print("Sell the car!")

elif (consumption >= 8) and (consumption <= 12):
    print("Economic!")

else:
    print("Super economical!")
```

EXAMPLE 27
Write a program that, given the age of a swimmer, classifies it in one of the following categories:

CATEGORY	AGE
Child A	5 to 7
Child B	8 to 10
Juvenile A	11 to 13
Juvenile B	14 to 17
Senor	Older than 18

```
age = int(input("Enter the swimmer's age: "))

print()
if (age >= 5) and (age <= 7):
    print("Child A")

elif (age >= 8) and (age <= 10):
    print("Child B")
```

```python
    elif (age >= 11) and (age <= 13):
        print("Juvenile A")

    elif (age >= 14) and (age <= 17) :
        print("Juvenile B")

    elif age > 18:
        print("Senior")

    else:
        print("Not classified to age less than 5 years")
```

EXAMPLE 28

Make a program that reads three positive integers and calculates one of the following averages according to a numeric value entered by the user:

a) geometric mean: $\sqrt[3]{(x * y * z)}$

b) weighted average: $\dfrac{x + 2 * y + 3 * z}{6}$

c) harmonic mean: $\dfrac{1}{\left(\frac{1}{x}\right) + \left(\frac{1}{y}\right) + \left(\frac{1}{z}\right)}$

d) arithmetic average: $\dfrac{x + y + z}{3}$

```python
from math import ceil

x = int(input("Enter the first value: "))
y = int(input("Enter the second value: "))
z = int(input("Enter the third value: "))

print()
print("[1] Geometric: ³√x * y * z\n"
      "[2] Weighted: (x + 2 * y + 3 * z) / 6\n"
      "[3] Harmonic: 1 / ((1 / x) + (1 / y) + (1 / z))\n"
      "[4] Arithmetic: (x + y + z) / 3")

calculation = int(input("choose the type of calculation [1][2][3][4]: "))

print()
if calculation == 1:
    result = (x * y * z) ** (1 / 3)
    print(f"The result: {result}")

elif calculation == 2:
```

```python
        result = (x + 2 * y + 3 * z) / 6
        print(f"The result: {result}")

elif calculation == 3:
        result = 1 / (1 / x) + (1 / y) + (1 / z)
        print(f"The result: {result}")

elif calculation == 4:
        result = (x + y + z) / 3
        print(f"The result: {result}")

else:
        print("This option doesn't exist.")
```

EXAMPLE 29

Take a math test for children who are learning to add whole numbers less than 100. Choose random numbers between 1 and 100, and show the question: what is the sum of a + b, where a and b are random numbers. Ask for the answer. Ask the student five questions, and show him the correct questions and answers, as well as how many times the student got it right.

```python
from random import randint

num1 = randint(1, 100)
num2 = randint(1, 100)

print(f"What is the sum of {num1} + {num2}?")
result1 = int(input(""))


num3 = randint(1, 100)
num4 = randint(1, 100)

print(f"What is the sum of {num3} + {num4}?")
result2 = int(input(""))


num5 = randint(1, 100)
num6 = randint(1, 100)

print(f"What is the sum of {num5} + {num6}?")
result3 = int(input(""))
```

```
num7 = randint(1, 100)
num8 = randint(1, 100)

print(f"What is the sum of {num7} + {num8}?")
result4 = int(input(""))


num9 = randint(1, 100)
num10 = randint(1, 100)

print(f"What is the sum of {num9} + {num10}?")
result5 = int(input(""))

right_answers = 0
print()
if result1 == (num1 + num2):
    right_answers += 1

if result2 == (num3 + num4):
    right_answers += 1

if result3 == (num5 + num6):
    right_answers += 1

if result4 == (num7 + num8):
    right_answers += 1

if result5 == (num9 + num10):
    right_answers += 1

print("Answers:")
print(f"{num1} + {num2} = {num1 + num2}")
print(f"{num3} + {num4} = {num3 + num4}")
print(f"{num5} + {num6} = {num5 + num6}")
print(f"{num7} + {num8} = {num7 + num8}")
print(f"{num9} + {num10} = {num9 + num10}")
print()

print(f"Number of correct answers: {right_answers}")
```

EXAMPLE 30
Make a program that receives three numbers and shows them in ascending order.

```
num1 = int(input("Enter the first number: "))
```

```
num2 = int(input("Enter the second number: "))
num3 = int(input("Enter the third number: "))

print()
if (num1 >= num2) and (num2 >= num3):
    print(f"Ascending order: {num3}-{num2}-{num1}")

elif (num1 >= num3) and (num3 >= num2):
    print(f"Ascending order: {num2}-{num3}-{num1}")

elif (num2 >= num1) and (num1 >= num3):
    print(f"Ascending order: {num3}-{num1}-{num2}")

elif (num2 >= num3) and (num3 >= num1):
    print(f"Ascending order: {num1}-{num3}-{num2}")

elif (num3 >= num1) and (num1 >= num2):
    print(f"Ascending order: {num2}-{num1}-{num3}")

elif (num3 >= num2) and (num2 >= num1):
    print(f"Ascending order: {num1}-{num2}-{num3}")

else:
    print("Unexpected error!")
```

EXAMPLE 31

Make a program that receives a person's height and weight. According to the table below, check and show the classification of that person.

Height	Weight		
	until 60	Between 80 and 90	Above 90
Less than 1,20m	A	D	G
From 1,20m to 1,70m	B	E	H
Above 1,70m	C	F	I

```
height = float(input("Enter the height (in meters): "))
weight = float(input("Enter the weight(kg): "))

if (height <= 1.20) and (weight <= 60):
    print("Classification: A")

elif (height > 1.20) and (height <= 1.70) and (weight <= 60):
    print("Classification: B")
```

```
elif (height > 1.70) and (weight <= 60):
    print("Classification: C")

elif (height <= 1.20) and (weight > 60) and (weight <= 90):
    print("Classification: D")

elif (height > 1.20) and (height <= 1.70) and (weight > 60) and (weight <= 90):
    print("Classification: E")

elif (height > 1.70) and (weight > 60) and (weight <= 90):
    print("Classification: F")

elif (height <= 1.20) and (weight > 90):
    print("Classification: G")

elif (height > 1.20) and (height <= 1.70) and (weight > 90):
    print("Classification: H")

elif (height > 1.70) and (weight > 90):
    print("Classification: I")

else:
    print("Unexpected error !")
```

EXAMPLE 32

Write a program that reads the code of the product chosen from the menu of a snack bar and its quantity. The program must calculate the amount to be paid for that snack. Consider that for each execution only one order will be calculated. The snack bar menu follows the pattern below:

Especification	Code	Price
Hot dog	100	1.20
PB & J	101	1.30
Ham and cheese sandwich	102	1.50
Hamburguer	103	1.20
Cheeseburguer	104	1.70
Juice	105	2.20
Soda	106	1.00

```
code = int(input("Enter the product code: "))
quantity = int(input("Enter the product quantity: "))

if code == 100:
    price = 1.20
    print(f"{quantity} Hot dog(s) = {price * quantity}")

elif code == 101:
```

```
        price = 1.30
        print(f"{quantity} PB & J(s) = {price * quantity}")

    elif code == 102:
        price = 1.50
        print(f"{quantity} Ham and cheese sandwich(s) = {price * quantity}")

    elif code == 103:
        price = 1.20
        print(f"{quantity} Hamburguer(s) = {price * quantity}")

    elif code == 104:
        price = 1.70
        print(f"{quantity} Cheeseburger(s) = {price * quantity}")

    elif code == 105:
        price = 2.20
        print(f"{quantity} Juice(s) = {price * quantity}")

    elif code == 106:
        price = 1.0 0
        print(f"{quantity} Soda(s) = {price * quantity}")

    else:
        print("Invalid code!")
```

EXAMPLE 33
A new product will increase according to the table below. Read the old price, calculate and write the new price, and write a message according to the new price (according to the second table)

OLD PRICE	INCREASE PERCENTAGE
until US$ 50	5%
between US$ 50 and US$ 100	10%
above US$ 100	15%

NEW PRICE	MESSAGE
until US$ 80	Cheap
between US$ 80 and US$ 120	Normal
between US$ 120 and US$ 200	Expensive
above US$ 200	Very expensive

```
old_price = float(input("Enter the old price: US$ "))

print()
```

```
if (old_price > 0) and (old_price <= 50):
    new_price = old_price + (old_price * 0.05)
    print("US$%.2f" % new_price)
    print("Cheap")

elif (old_price > 50) and (old_price <= 100):
    new_price = old_price + (old_price * 0.10)
    print("US$%.2f" % new_price)

    if new_price <= 80:
        print("Cheap")

    elif (new_price > 80) and (new_price <=120):
        print("Normal")

elif old_price > 100:
    new_price = old_price + (old_price * 0.15)
    print("US$%.2f" % new_price)

    if (new_price > 80) and (new_price <= 120):
        print("Normal")

    elif (new_price > 120) and (new_price <= 200):
        print("Expensive")

    elif new_price > 200:
        print("Very Expensive")

else:
    print("Invalid Value")
```

EXAMPLE 34

Read a student's grade and number of absences, and write down his concept. According to the table below, when a student has more than 20 absences, a reduction in concept occurs.

GRADE	CONCEPT (UNTIL 20 ABSENCES)	CONCEPT (MORE THAN 20 ABSENCES
9.0 to 10.0	A	B
7.5 to 8.9	B	C
5.0 to 7.4	C	D
4.0 to 4.9	D	E
0.0 to 3.9	E	E

```python
grade = float(input("Enter the student's grade: "))
absences = int(input("Enter the student's number of absences: "))

print()
if (grade >= 9.0) and (grade <= 10.0):

    if (absences >= 0) and (absences <= 20):
        print("Concept: A")
    elif absences > 20:
        print("Concept: B")
    else:
        print("Invalid number of absences")

elif (grade >= 7.5) and (grade <= 8.9):

    if (absences >= 0) and (absences <= 20):
        print("Concept: B")
    elif absences > 20:
        print("Concept: C")
    else:
        print("Invalid number of absences")

elif (grade >= 5.0) and (grade <= 7.4):

    if (absences >= 0) and (absences <= 20):
        print("Concept: C")
    elif absences > 20:
        print("Concept: D")
    else:
        print("Invalid number of absences")

elif (grade >= 4.0) and (grade <= 4.9):

    if (absences >= 0) and (absences <= 20):
        print("Concept: D")
    elif absences > 20 :
        print("Concept: E")
    else:
        print("Invalid number of absences")

elif (grade >= 0.0) and (grade <= 3.9):

    if (absences >= 0) and (absences <= 20):
        print("Concept: E")
    elif absences > 20:
```

```
                print("Concept: E")
        else:
            print("Invalid number of absences")


    else:
        print("Grade out of used range.")
```

EXAMPLE 35

Read a date and determine if it is valid. That is, check that the month is between 1 and 12 and that the day exists in that month. Note that February has 29 days in leap years and 28 days in non-leap years.

```
day = int(input("Enter the day of the month: "))
month = int(input("Enter the month of the year: "))
year = int(input("Enter the year: "))

print()
if year != 0:
    if month == 1:

        if (day >= 1) and (day <= 31):
            print("Valid date")

        else:
            print("Invalid day")

    elif month == 2:

        if (year % 400 == 0) or ((year % 4 == 0) and not (year % 100 == 0)):
            if (day >= 1) and (day <= 29):
                print("Valid date")
            else:
                print("Invalid day" )

        else:
            if (day >= 1) and (day <= 28):
                print("Valid date")
            else:
                print("Invalid day")

    elif month == 3:
        if (day >= 1) and (day <= 31):
            print("Valid date")
```

```python
    else:
        print("Invalid day")

elif month == 4:
    if (day >= 1) and (day <= 30):
        print("Valid date")

    else:
        print("Invalid day")

elif month == 5:
    if (day >= 1) and (day <= 31):
        print("Valid date" )

    else:
        print("Invalid day")

elif month == 6:
    if (day >= 1) and (day <= 30):
        print("Valid date")

    else:
        print("Invalid day")

elif month == 7:
    if (day >= 1) and (day <= 31):
        print("Valid date")

    else:
        print("Invalid day")

elif month == 8:
    if (day >= 1) and (day <= 31):
        print("Valid date")

    else:
        print("Invalid day" )

elif month == 9:
    if (day >= 1) and (day <= 30):
        print("Valid date")

    else:
        print("Invalid day")
```

```
        elif month == 10:
            if (day >= 1) and (day <= 31):
                print("Valid date")

            else:
                print("Invalid day")

        elif month == 11:
            if (day >= 1) and (day <= 30):
                print("Valid date")

            else:
                print("Invalid day")

        elif month == 12:
            if (day >= 1) and (day <= 31) :
                print("Valid date")

            else:
                print("Invalid day")

        else:
            print("Invalid number of the month")

    else:
        print("The year can't be 0")
```

EXAMPLE 36
Write a program that, given the amount of monthly sale, prints the commission that must be paid to the seller. To calculate the commission, consider the table below.

Monthly sale	Comission
Greater than US$ 100,000.00	US$ 700.00 + 16% of the sales
Less than US$ 100,000.00 and greater or equal to US$ 80,000.00	US$ 650 + 14% of the sales
Less than US$80,000.00 and greater or equal to US$ 60,000.00	US$ 600.00 + 14% of the sales
Less than US$ 60,000.00 and greater or equal to US$ 40,000.00	US$ 550.00 + 14% of the sales
Less than US$ 40,000.00 and greater or equal to US$ 20,000.00	US$ 500.00 + 14% of the sales

Less than US$ 20,000.00	US$ 400.00 + 14% of the sales

```python
monthly_sale = float(input("Enter the amount sold in the month: "))

print()
if monthly_sale >= 100_000:
    comission = 700 + (monthly_sale * 0.16)
    print("commission that will be paid to the seller: US$%.2f" % comission)

elif monthly_sale >= 80_000 and monthly_sale < 100_000:
    comission = 650 + (monthly_sale * 0.14)
    print("commission that will be paid to the seller: US$%.2f" % comission)

elif (monthly_sale) >= 60_000 and (monthly_sale < 80_000):
    comission = 600 + (monthly_sale * 0.14 )
    print("commission that will be paid to the seller: R$%.2f" % comission)

elif (monthly_sale >= 40_000) and (monthly_sale < 60_000):
    comission = 550 + (monthly_sale * 0.14)
    print("commission that will be paid to the seller: R$%.2f" % comission)

elif (monthly_sale >= 20_000) and (monthly_sale < 40_000):
    comission = 500 + (monthly_sale * 0.14)
    print("commission that will be paid to the seller: R$%.2f" % comission)

elif (monthly_sale > 0) and (monthly_sale < 20_000):
    comission = 400 + (monthly_sale * 0.14)
    print("commission that will be paid to the seller: R$%.2f" % comission)

else:
    print("Invalid value")
```

EXAMPLE 37
The rates for a certain car park are as follows:
- 1st and 2nd hour - $ 1.00 each
- 3rd and 4th hour - $ 1.4 each
- 5th hour onwards - $ 2.00 each

The number of hours to be paid is always whole. Thus, those who park for 61 minutes will pay for two hours, which is the same as if they had stayed for 120 minutes. The moments of arrival at the park and its departure are presented as pairs of integers, representing hours and minutes. For example, pair 12 50 will represent "ten to one in the afternoon". It is intended to create a program that, when read from the keyboard, the

moments of arrival and departure take place with an interval not exceeding 24 hours. Therefore, if a given arrival time is higher than the departure time, this is not an error situation, but will mean that the departure took place the day after the arrival.

```python
arrival_hour = int(input("Enter the arrival hour: "))
arrival_minute = int(input("Enter the arrival minute: "))

print()
departure_hour = int(input("Enter the departure hour: "))
departure_minute = int(input("Enter the departure minute: "))

interval_hour = 0
interval_minute = 0

print()
if (arrival_hour >= 0) and (arrival_hour < 24) and (departure_hour >= 0) and (departure_hour < 24):

    if departure_hour < arrival_hour:

        interval_hour = 24 + (departure_hour - arrival_hour)
        if (arrival_minute >= 0) and (arrival_minute < 60) and (departure_minute >= 0) and (departure_minute < 60):

            if arrival_minute >= departure_minute:
                interval_minute = arrival_minute - departure_minute

                if interval_minute > 0:
                    interval_hour += 1
                    interval_minute = 0

            else:
                interval_minute = departure_minute - arrival_minute

                if interval_minute > 0:
                    interval_hour += 1
                    interval_minute = 0

        else:
            print("Minutes out of the range of 0 - 59")

    else:
        interval_hour = departure_hour - arrival_hour
        if (arrival_minute >= 0) and (arrival_minute < 60) and (departure_minute >= 0) and (departure_minute < 60):
```

```python
            if arrival_minute >= departure_minute:
                interval_minute = arrival_minute - departure_minute

                if interval_minute > 0:
                    interval_hour += 1
                    interval_minute = 0

            else:
                interval_minute = departure_minute - arrival_minute

                if interval_minute > 0:
                    interval_hour += 1
                    interval_minute = 0

        else:
            print("Minute out of the range of 0 to 59")

    else:
        print("Hour out of the range of 0 to 23")


if interval_hour > 0:

    print(f"Time spent in parking lot: {interval_hour} hours ")

    if (interval_hour >= 1) and (interval_hour <= 2):
        print(f"Must pay ${interval_hour* 1.00}")

    elif (interval_hour >= 3) and (interval_hour <= 4) :
        print(f"Must pay ${interval_hour* 1.40}")

    elif interval_hour > 5:
        print(f"Must pay ${interval_hour* 2.00}")

    else:
        print("Error")

else:
    print("Time spent in parking lot can't be 0")
```

EXAMPLE 38
Read a person's date of birth provided using three integers: Day, Month and Year. Test the validity of this date to see if it is a valid date. Test whether the given day is a valid day:: day greater than zero, day less than or equal to 28 for the month of February (29 if the

year is a leap), day less than or equal to 30 in April, June, September and November, day less than or equal to 31 in other months. Test the validity of the month: month greater than zero and month less than 13. Test the validity of the year: year less than or equal to the current year (use a constant defined with the value equal to the current year). Print: "valid date" or "invalid date" at the end of the program's execution.

```python
year = int(input("Enter the year of your birth: "))
month = int(input("Enter the month of your birth, in numbers: "))
day = int(input("Enter the day of your birth, in numbers: "))

current_year = 2020

print()
if year <= current_year:
    if month == 1:

        if (day >= 1) and (day <= 31):
            print("Valid date")

        else:
            print("Invalid date")

    elif month == 2:

        if (year % 400 == 0) or ((year % 4 == 0) and not (year % 100 == 0)) :
            if (day >= 1) and (day <= 29):
                print("Valid date")
            else:
                print("Invalid date")

        else:
            if (day >= 1) and (day <= 28):
                print("Valid date")
            else:
                print("Invalid date")

    elif month == 3:
        if (day >= 1) and (day <= 31):
            print("Valid date")

        else:
            print("Invalid date")

    elif month == 4:
        if (day >= 1) and (day <= 30):
```

```python
        print("Valid date")

    else :
        print("Invalid date")

elif month == 5:
    if (day >= 1) and (day <= 31):
        print("Valid date")

    else:
        print("Invalid date")

elif month == 6:
    if (day >= 1) and (day <= 30):
        print("Valid date")

    else:
        print("Invalid date")

elif month == 7:
    if (day >= 1) and (day <= 31):
        print("Valid date")

    else:
        print("Invalid date" )

elif month == 8:
    if (day >= 1) and (day <= 31):
        print("Valid date")

    else:
        print("Invalid date")

elif month == 9:
    if (day >= 1) and (day <= 30):
        print("Valid date")

    else:
        print("Invalid date")

elif month == 10:
    if (day >= 1) and (day <= 31):
        print("Valid date")

    else:
```

```
            print("Invalid date")

        elif month == 11:
            if (day >= 1) and (day <= 30) :
                print("Valid date")

            else:
                print("Invalid date")

        elif month == 12:
            if (day >= 1) and (day <= 31):
                print("Valid date")

            else:
                print("Invalid date")

        else:
            print("Invalid date")

    else:
        print("Invalid date")
```

EXAMPLE 39

EXAMPLE 39

A company decides to give its employees a raise according to a table that considers each employee's current salary and length of service. Employees with a lower salary will have a proportionally larger increase than employees with a higher salary and, depending on the length of service at the company, each employee will receive an additional salary bonus. Make a program that reads:

- the value of the employee's current salary
- the employee's length of service at the company (number of years of service at the company)

Use the tables below to calculate this employee's adjusted salary and print the final adjusted salary amount, or a message if the employee is not entitled to any increase.

Current salary	Readjustment %	Length of service	Bonus
Untill 500.00	25%	Less than 1 years	No bonus
Until 1,000.00	20%	From 1 to 3 years	100.00
Until 1,500.00	15%	From 4 to 6 years	200.00
Until 2,000.00	10%	From 7 to 10 years	300.00
Greater than 2,000.00	No readjustment	More than 10 years	500.00

```
current_salary = float(input("Enter the employee's salary: "))
length_service = int(input("Enter the employee's length of service (in years): "))
```

```python
final_salary = 0.0

print()
if (current_salary > 0) and (current_salary <= 500):
    final_salary = current_salary + (current_salary * 0.25)

elif (current_salary > 500) and (current_salary <= 1000):
    final_salary = current_salary + (current_salary * 0.20)

elif (current_salary > 1000) and (current_salary <= 1500):
    final_salary = current_salary + (current_salary * 0.15)

elif (current_salary > 1500) and (current_salary <= 2000):
    final_salary = current_salary + (current_salary * 0.10)

elif current_salary > 2000:
    final_salary = current_salary

else:
    print("Invalid salary")


if (length_service >= 0) and (length_service < 1) :
    print("No bonus")

elif (length_service >= 1) and (length_service <= 3):
    final_salary += 100
    print("Bonus of 100.00")
elif (length_service >= 4) and (length_service <= 6):
    final_salary += 200
    print("Bonus of 200.00")

elif (length_service >= 7) and (length_service <= 10):
    final_salary += 300
    print("Bonus of 300.00")

elif length_service > 10:
    final_salary += 500
    print("Bonus of 500.00")

else:
    print("Invalid length of service")


print("Final Salary: %.2f" % final_salary)
```

EXAMPLE 40

The cost to the consumer of a new car is the sum of the factory cost, the distributor's commission and taxes. The commission and taxes are calculated on the factory cost, according to the table below. Read the factory cost and write the cost to the consumer

FACTORY COST	DISTRIBUTOR'S %	TAX %
Until 12,000.00	5%	no tax
From 12,000.00 to 25,000.00	10%	15%
from 25,000.00 on	15%	20%

```python
factory_cost = float(input("Enter the factory cost of the car: "))

costumer_cost = 0.0

print()
if (factory_cost > 0) and (factory_cost <= 12000) :
    costumer_cost = factory_cost + (factory_cost * 0.05)
    print("5% of distributor's commission")

elif (factory_cost > 12000) and (factory_cost <= 25000):
    costumer_cost = factory_cost + (factory_cost * 0.1)
    print("10% of distributor's commission")

elif factory_cost > 25000:
    costumer_cost = factory_cost + (factory_cost * 0.15)
    print("15% of distributor's commission")

else:
    print("Invalid value")


if (factory_cost > 0) and (factory_cost <= 12000):
    print("Tax exempt")

elif (factory_cost > 12000) and (factory_cost <= 25000):
    costumer_cost += factory_cost * 0.15
    print("15% tax on factory value")

elif factory_cost > 25000 :
    costumer_cost += factory_cost * 0.2
    print("20% tax on factory value")


print("Car value for the consumer: %.2f" % costumer_cost)
```

EXAMPLE 41

Make an algorithm that calculates a person's BMI and shows his classification according to the table below:

BMI	Classification
<18.5	Under weight
18.6 - 24.9	Healthy
25.0 - 29.9	Excess weight
30.0 - 34.9	Obesity Grade I
35.0 - 39.9	Grade II Obesity (Severe)
>= 40.0	Grade III Obesity (Morbid)

```python
height = float(input("Enter your height (in meters and centimeters (ex: 1.72)): "))
weight = float(input("Enter your weight (in kg): "))


if (height > 0) and (weight > 0):
    imc = weight / (height * height)
    print("%.2f" % imc)

    if (imc >= 0) and (imc <= 18.5):
        print("Under weight")

    elif (imc >= 18.6) and (imc <= 24.9):
        print("Healthy")

    elif (imc >= 25) and (imc <= 29.9):
        print("Excess weight")

    elif (imc >= 30) and (imc <= 34.9):
        print("Grade I Obesity ")

    elif (imc >= 35) and (imc <= 39.9):
        print("Grade II Obesity  (Severe)" )

    else:
        print("Grade III Obesity (Morbid)")

else:
    print("Invalid values.")
```