

Programming

Lab Sessions



Exercise 1

- Write a program where the user can input a year (eg 2003). The program must print if the year is a leap year or not. A leap year is a year divisible by 400 or divisible by 4 but not by 100.

```
year = input("Type in a year: ")  
if (year%4 == 0 and ano%100!= 0) or year%400 == 0:  
    print(year, "is a leap year.")  
else:  
    print(year, "is not a leap year.")
```

Exercise II

- Write a program where the user can input the population of two countries and their annual growth rates in %. The program must calculate and print out the number of years it will take for the population of the first country to grow larger than the population of the second country.

```
popA=int(input("Population country A: "))
while popA<0:
    popA=int(input("The population must be larger than 0: "))
rateA=float(input("Growth rate for country A: "))

popB=int(input("Population country B: "))
while popB<0:
    popB=int(input("The population must be larger than 0: "))
rateB=float(input("Growth rate for country B: "))

year=0
while popA < popB:
    year = year + 1
    popA = int((1 + (rateA/100) ) * popA)
    popB = int((1 + (rateB/100) ) * popB)
    print("Year ", year)
    print("Population for A: ", popA)
    print("Population for B: ", popB)
    print(" ")
    print(" ")

print("It will take",year,'years for the population of A to grow larger than B')
```

Exercise III

- Write a program where the user can input the positive numbers. The program must then count and inform how many of them fall on the following intervals: [0-25], [26-50], [51-75], [76-100]. The input phase should end when the user inputs a negative number.

```
number = 0
```

```
interval025 = 0
```

```
interval2650 = 0
```

```
interval5175 = 0
```

```
interval76100 = 0
```

```
while (number >= 0):
```

```
    number = int(input('Please type a number: '))
```

```
    if (number >= 0):
```

```
        if (number <= 25):
```

```
            interval025 += 1
```

```
        elif (number <= 51):
```

```
            interval2650 += 1
```

```
        elif (number <= 75):
```

```
            interval5175 += 1
```

```
        elif (number <= 100):
```

```
            interval76100 += 1
```

```
print('Number in the interval [0-25]:', interval025)
```

```
print('Number in the interval [26-50]:', interval2650)
```

```
print('Number in the interval [51-75]:', interval5175)
```

```
print('Number in the interval [76-100]:', interval76100)
```

Exercise IV

- A worker was hired in 2006 with a salary of 1000 SEK. In 2007 his salary was increased by 1.5%. From 1997 onwards, his salary was increased by double the percentage of the increase of the previous year. Write a program that calculates the current salary of the worker.

```
salary = 1000.0  
increase = 1.5  
year = 2006
```

```
while (year <= 2020):  
    print('Year', year, 'Increase', increase, 'Salary', salary)  
    salary = salary + (salary * (increase / 100.0))  
    increase = increase * 2  
    year = year + 1  
  
print('Current salary: ', salary)
```

Exercise V

- In a long jump competition a jumper has 5 attempts. His best and worse attempts are discarded and the average of the remaining 3 attempts is used as the result. Write a program where the user can input the 5 attempts in any order, the program must calculate and print the average of the valid attempts as well as the discarded best and worse attempts.

```
#Initialize best with 0, any jump will be better  
best = 0
```

```
#Initialize jump with infinite, any jump will be worse  
worse = float('inf')
```

```
#Initialize sum of jumps  
soma = 0
```

```
#Get 5 jump totals
```

```
for jump in range(5):  
    current = float(input('Please enter the jump total: '))
```

```
#If the jump was the best, make it the best
```

```
if current > best:  
    best = current
```

```
#If the jump was the worse, make it the worse
```

```
if current < worse:  
    worse = current
```

```
#Sum all jumps
```

```
soma = soma + current
```

```
#Remove best and worse jumps from total
```

```
soma = soma - best - worse
```

```
#Get the average and print results
```

```
avg = soma/3
```

```
print('The average of the jumps not discarded was', avg)
```

```
print('The best jump was', best)
```

```
print('The worse jump was', worse)
```

Fin