Q1 A year is considered to be 365 days long. However, a more exact figure is 365.24 days. As a consequence, if we held to the standard 365-day year, we would gradually lose that fraction of the day over time, and seasons and other astronomical events would not occur as expected. A leap year is a year that has an extra day, February 29, to keep the timescale on track. Leap years occur on years that are exactly divisible by 4, unless it is exactly divisible by 100, unless it is divisible by 400. For example, the year 2004 is a leap year, the year 1900 is not a leap year, and the year 2000 is a leap year. Write a simple program in python to compute the number of leap years between the years 1500 and 2010.

In [ ]:
```
#write code for ques1 here
```

Q2.Create a dictionary that has the keys 'A', 'B', 'C' with values 'a', 'b', 'c' individually. Print all the keys in the dictionary.

In [ ]:
```
# write code for ques2 here
```

Q3. Write a program to Get the last word 'great' from 'Python is great!'

In [ ]:
```
# write Code for ques3 here
```

Q4. Write a function my_tip_calc(bill, party), where bill is the total cost of a meal and party is the number of people in the group. The tip should be calculated as 15% for a party strictly less than six people, 18% for a party strictly less than eight, 20% for a party less than 11, and 25% for a party 11 or more. A couple of test cases are given below.

t = 16.3935

t = my_tip_calc(109.29,3) print(t)

In [ ]:
```
#write the solution to ques 4 in this cell.

def my_tip_calc(bill, party):
    # write your function code here

    return tips
```

Q5. Write a function my_letter_grader(percent), where grade is the string 'A+' if percent is greater than 97, 'A' if percent is greater than 93, 'A-' if percent is greater than 90, 'B+' if percent is greater than 87, 'B' if percent is greater than 83, 'B-' if percent is greater than 80, 'C+' if percent is greater than 77, 'C' if percent is greater than 73, 'C-' if percent is greater than 70, 'D+' if percent is greater than 67, 'D' if percent is greater than 63, 'D-' if percent is greater than 60, and 'F' for any percent less than 60. Grades exactly on the division should be included in the higher grade category.

In [ ]:
```
#write code for  ques5 here

def my_letter_grader(percent):
    # write your function code here

    return grade
```

Q6. Most engineering systems have redundancy. That is, an engineering system has more than is required to accomplish its purpose. Consider a nuclear reactor whose temperature is monitored by three sensors. An

alarm should go off if any two of the sensor readings disagree. Write a function my_nuke_alarm(s1,s2,s3) where s1, s2, and s3 are the temperature readings for sensor 1, sensor 2, and sensor 3, respectively. The output should be the string 'alarm!' if any two of the temperature readings disagree by strictly more than 10 degrees and 'normal' otherwise.

Test Case:

my_nuke_alarm(94,96,90)

Output: 'normal'

my_nuke_alarm(94,96,80)

Output: 'alarm!'

In [ ]:
```
#write code for ques 6 here

def my_nuke_alarm(s1,s2,s3):
    # write your function code here

    return response
```

Ques7. The interest, i, on a principle, P0, is a payment for allowing the bank to use your money. Compound interest is accumulated according to the formula Pn=(1+i)Pn−1, where n is the compounding period, usually in months or years. Write a function my_saving_plan(P0, i, goal) where the output is the number of years it will take P0 to become goal at i% interest compounded annually.

In [ ]:
```
#write code for ques 7 here

def my_saving_plan(P0, i, goal):
    # write your function code here

    return years
```

Q8. Suppose, a fruit-seller sold 20 mangoes and 10 oranges in one day for a total of $350. The next day he sold 17 mangoes and 22 oranges for Rs500. If the prices of the fruits remained unchanged on both the days, what was the price of one mango and one orange? Write a python program to solve for the prices of mango and orange.

In [ ]:
```
#write your code for ques8 here
```

Q9. If a matrix A has first row as 2,3,4 as its elements. Second row as 4,5,6 and third row as 1,0,1. Then find the basis for this martrix if any using row reduced echelon form. Write python code for determining the row-reduced echelon form and from it identify the basis columns and print them.

In [ ]:
```
# write code for ques 9 here
```

Q10.

a.Write down the characteristic equation for matrix A=[[3,5], [2,3]].

b.Using the above characteristic equation to solve for eigenvalues and eigenvectors for matrix A.

c.Using the first eigenvector that derived from problem (b) to verify that Ax=λx.

d. Verify your calculation of eigenvalue and eigenvector by writing a python script below.

In this markdown cell, attach an image of the page on which you solved for value of eigenvectors and eigenvalues manually.

In [ ]:
```
# write code for ques 10 below.
```