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Artificial Intelligence with Python

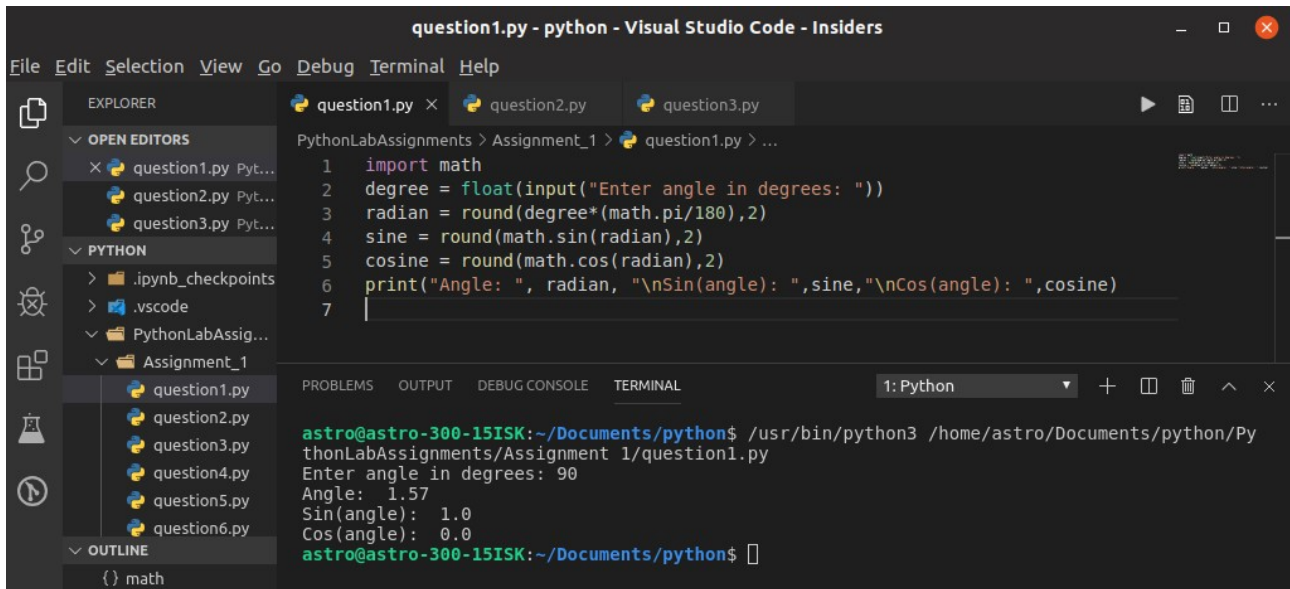
Lab Assignment – 01 (L39 & L40)

Prof Hemprasad Yashwant Patil

<https://colab.research.google.com/drive/1TIUzSCsP0a9o0-OIwgXua5-BA3Zjjrvq>

Question – 1

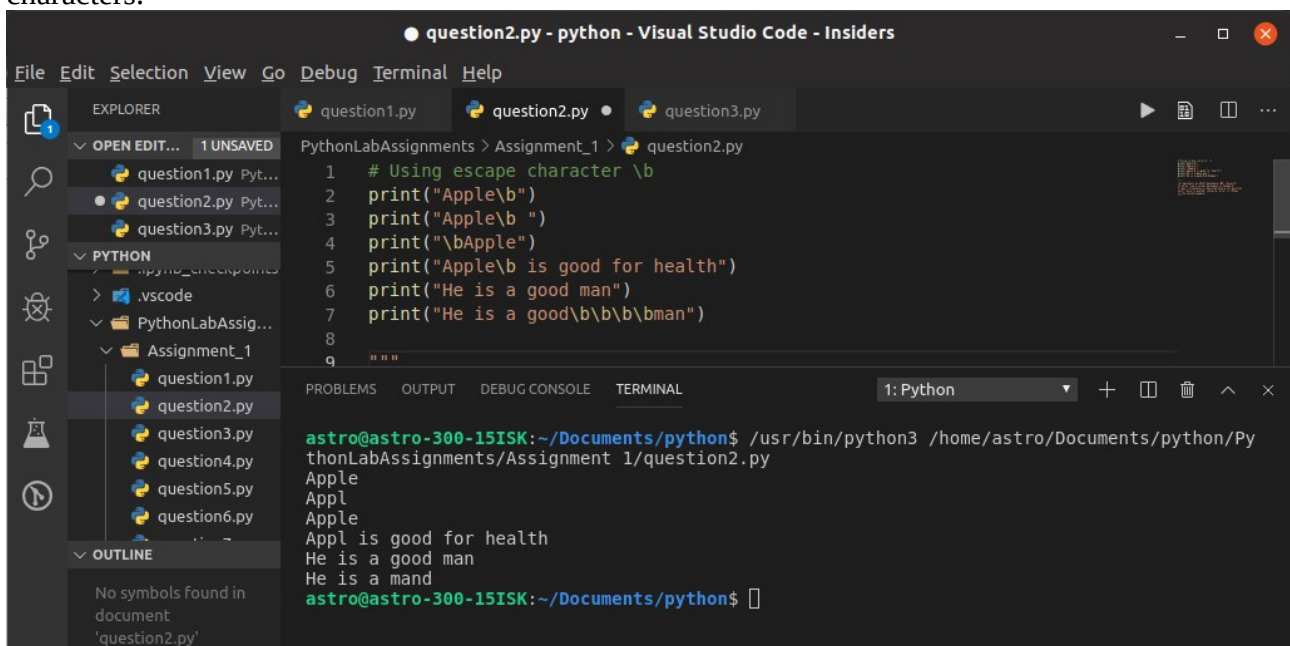
Write a series of Python statements that will import the math module, read a number from the user that represents an angle given in radians, and then prints the sine and cosine from the given angle.



```
question1.py - python - Visual Studio Code - Insiders
File Edit Selection View Go Debug Terminal Help
EXPLORER
  OPEN EDITORS
    question1.py Pyt...
    question2.py Pyt...
    question3.py Pyt...
  PYTHON
    .ipynb_checkpoints
    .vscode
    PythonLabAssig...
    Assignment_1
      question1.py
      question2.py
      question3.py
      question4.py
      question5.py
      question6.py
  OUTLINE
    {} math
question1.py
1 import math
2 degree = float(input("Enter angle in degrees: "))
3 radian = round(degree*(math.pi/180),2)
4 sine = round(math.sin(radian),2)
5 cosine = round(math.cos(radian),2)
6 print("Angle: ", radian, "\nSin(angle): ",sine,"\nCos(angle): ",cosine)
7
TERMINAL
1: Python
astro@astro-300-15ISK:~/Documents/python$ /usr/bin/python3 /home/astro/Documents/python/Py
thonLabAssignments/Assignment 1/question1.py
Enter angle in degrees: 90
Angle: 1.57
Sin(angle): 1.0
Cos(angle): 0.0
astro@astro-300-15ISK:~/Documents/python$
```

Question – 2

Try writing a print statement that uses the escape character \b. What do you think this is doing? Try placing several characters before and after the \b. Try typing several in a row after a series of characters.



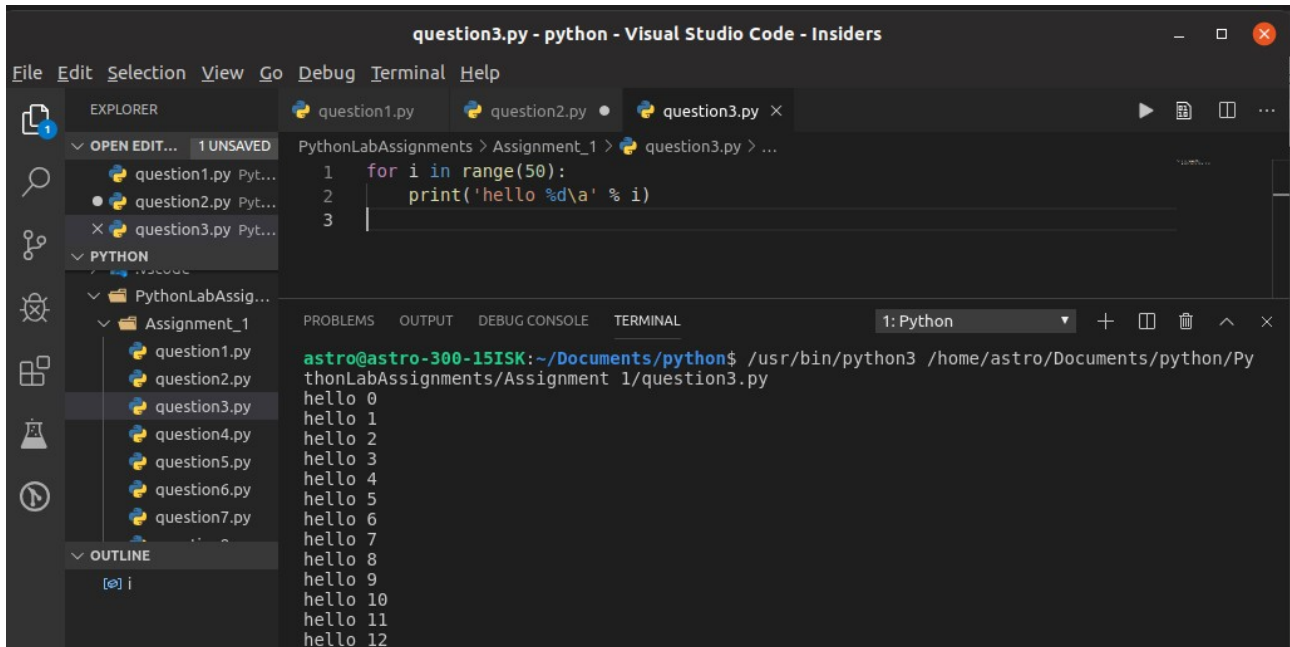
```
question2.py - python - Visual Studio Code - Insiders
File Edit Selection View Go Debug Terminal Help
EXPLORER
  OPEN EDIT... 1 UNSAVED
    question1.py Pyt...
    question2.py Pyt...
    question3.py Pyt...
  PYTHON
    .ipynb_checkpoints
    .vscode
    PythonLabAssig...
    Assignment_1
      question1.py
      question2.py
      question3.py
      question4.py
      question5.py
      question6.py
  OUTLINE
    No symbols found in
    document
    'question2.py'
question2.py
1 # Using escape character \b
2 print("Apple\b")
3 print("Apple\b ")
4 print("\bApple")
5 print("Apple\b is good for health")
6 print("He is a good man")
7 print("He is a good\b\b\b\bman")
8
9 """
TERMINAL
1: Python
astro@astro-300-15ISK:~/Documents/python$ /usr/bin/python3 /home/astro/Documents/python/Py
thonLabAssignments/Assignment 1/question2.py
Apple
Appl
Apple
Appl is good for health
He is a good man
He is a mand
astro@astro-300-15ISK:~/Documents/python$
```

\b represents an ASCII backspace (BS) character. It works like a normal backspace in keyboard. It won't eliminate a character before its position until there is another character after it (Shown in the second example).

For multiple \b symbols it will remove previous elements as many times used in the print function.

Question – 3

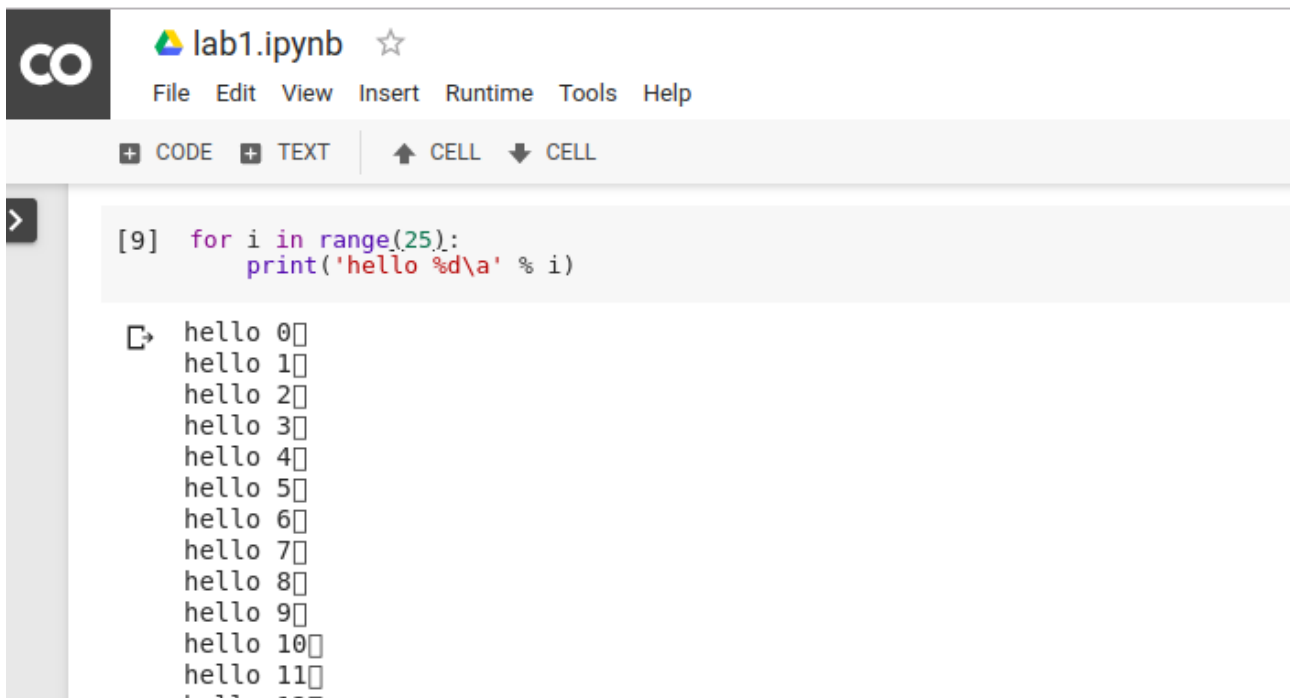
Try writing a print statement that uses the escape character \a. What do you think this is doing? Can you think of a use for this feature?



The screenshot shows the Visual Studio Code editor with a file named 'question3.py'. The code in the editor is:

```
1 for i in range(50):
2     print('hello %d\b' % i)
3
```

The terminal output shows the execution of the script, displaying 'hello 0' through 'hello 12' with backspace characters visible as small squares.



The screenshot shows a Jupyter Notebook interface with a code cell containing the following Python code:

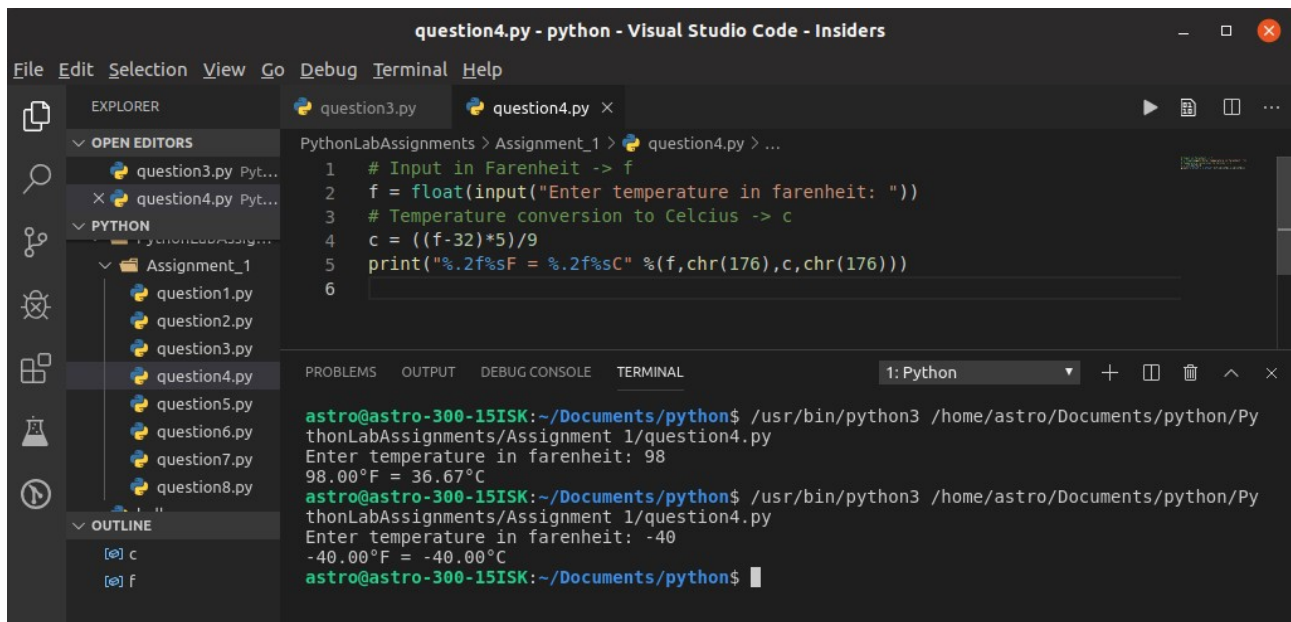
```
[9] for i in range(25):
    print('hello %d\b' % i)
```

The output of the code cell shows the execution of the loop, displaying 'hello 0' through 'hello 11' with backspace characters visible as small squares.

\a is an ASCII Bell symbol. It makes a ringing alert (like a BEEP sound) if run outside of IDLE. If you run in IDLE, it will print odd characters instead of beeping. Output is NULL for \a.

Question – 4

Write three Python statements. The first should read a number from the user that represents a temperature in Fahrenheit, placing the value into a variable named `f`. The second statement should convert the value into Celsius, placing the result into a variable named `c`. The third statement should print the values of `f` and `c` with a descriptive notation.

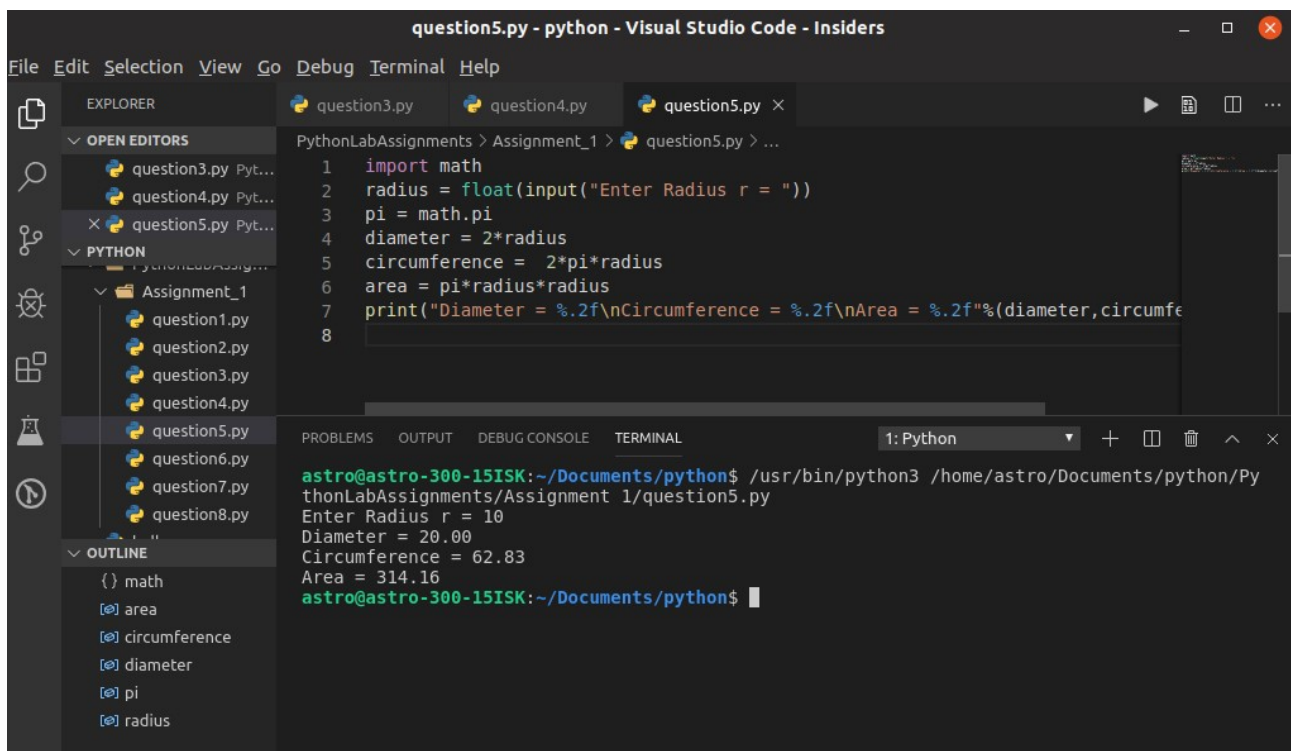


```
question4.py - python - Visual Studio Code - Insiders
File Edit Selection View Go Debug Terminal Help
EXPLORER
  OPEN EDITORS
    question3.py Pyt...
    question4.py Pyt...
  PYTHON
    Assignment_1
      question1.py
      question2.py
      question3.py
      question4.py
      question5.py
      question6.py
      question7.py
      question8.py
  OUTLINE
    c
    f
PythonLabAssignments > Assignment_1 > question4.py > ...
1 # Input in Farenheit -> f
2 f = float(input("Enter temperature in farenheit: "))
3 # Temperature conversion to Celcius -> c
4 c = ((f-32)*5)/9
5 print("%.2f%sF = %.2f%sC" %(f,chr(176),c,chr(176)))
6

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
1: Python
astro@astro-300-15ISK:~/Documents/python$ /usr/bin/python3 /home/astro/Documents/python/Py
thonLabAssignments/Assignment 1/question4.py
Enter temperature in farenheit: 98
98.00°F = 36.67°C
astro@astro-300-15ISK:~/Documents/python$ /usr/bin/python3 /home/astro/Documents/python/Py
thonLabAssignments/Assignment 1/question4.py
Enter temperature in farenheit: -40
-40.00°F = -40.00°C
astro@astro-300-15ISK:~/Documents/python$
```

Question – 5

Write a series of Python statements that will read a number from the user that represents the radius of a circle. Then use a print statement to show the circles diameter, circumference and area. You can import the math module and use the constant `math.pi` to represent the constant pi.

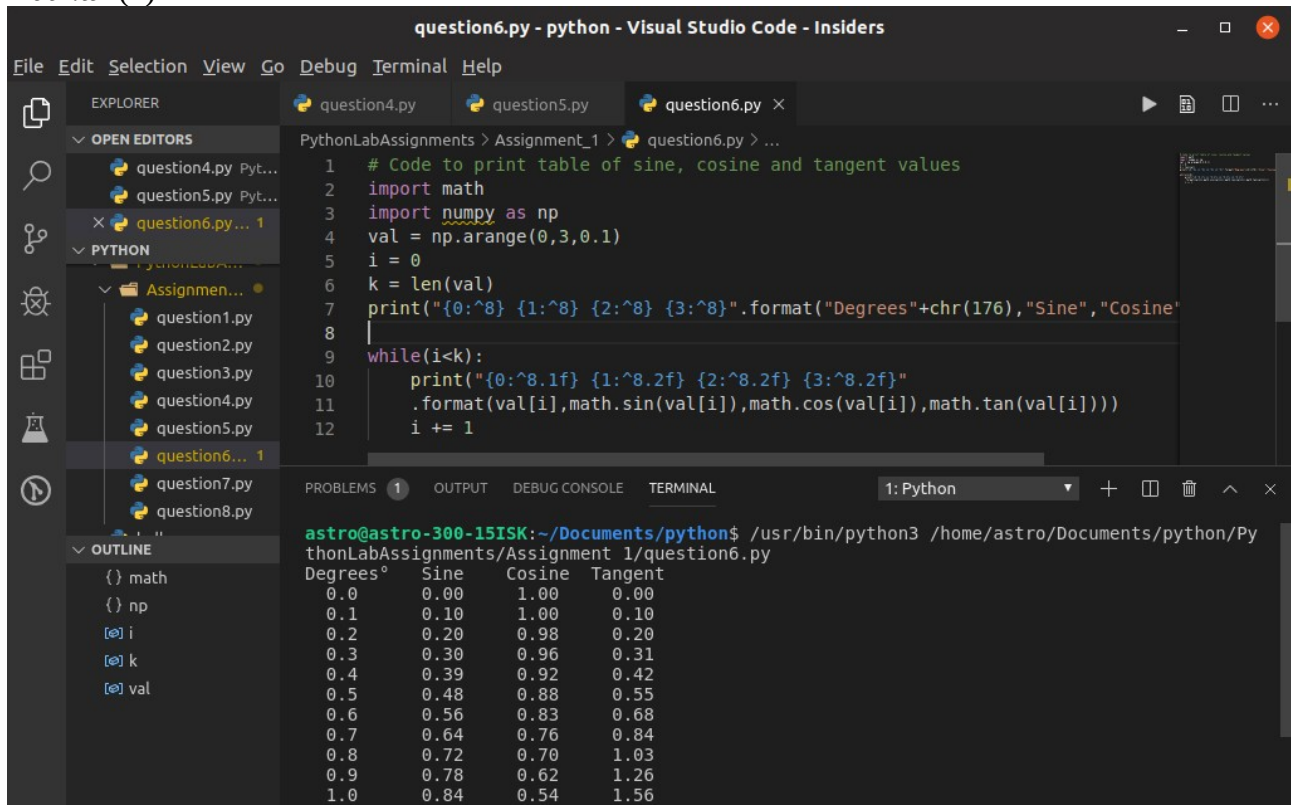


```
question5.py - python - Visual Studio Code - Insiders
File Edit Selection View Go Debug Terminal Help
EXPLORER
  OPEN EDITORS
    question3.py Pyt...
    question4.py Pyt...
    question5.py Pyt...
  PYTHON
    Assignment_1
      question1.py
      question2.py
      question3.py
      question4.py
      question5.py
      question6.py
      question7.py
      question8.py
  OUTLINE
    {} math
    area
    circumference
    diameter
    pi
    radius
PythonLabAssignments > Assignment_1 > question5.py > ...
1 import math
2 radius = float(input("Enter Radius r = "))
3 pi = math.pi
4 diameter = 2*radius
5 circumference = 2*pi*radius
6 area = pi*radius*radius
7 print("Diameter = %.2f\nCircumference = %.2f\nArea = %.2f"%(diameter,circumfe
8

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
1: Python
astro@astro-300-15ISK:~/Documents/python$ /usr/bin/python3 /home/astro/Documents/python/Py
thonLabAssignments/Assignment 1/question5.py
Enter Radius r = 10
Diameter = 20.00
Circumference = 62.83
Area = 314.16
astro@astro-300-15ISK:~/Documents/python$
```

Question – 6

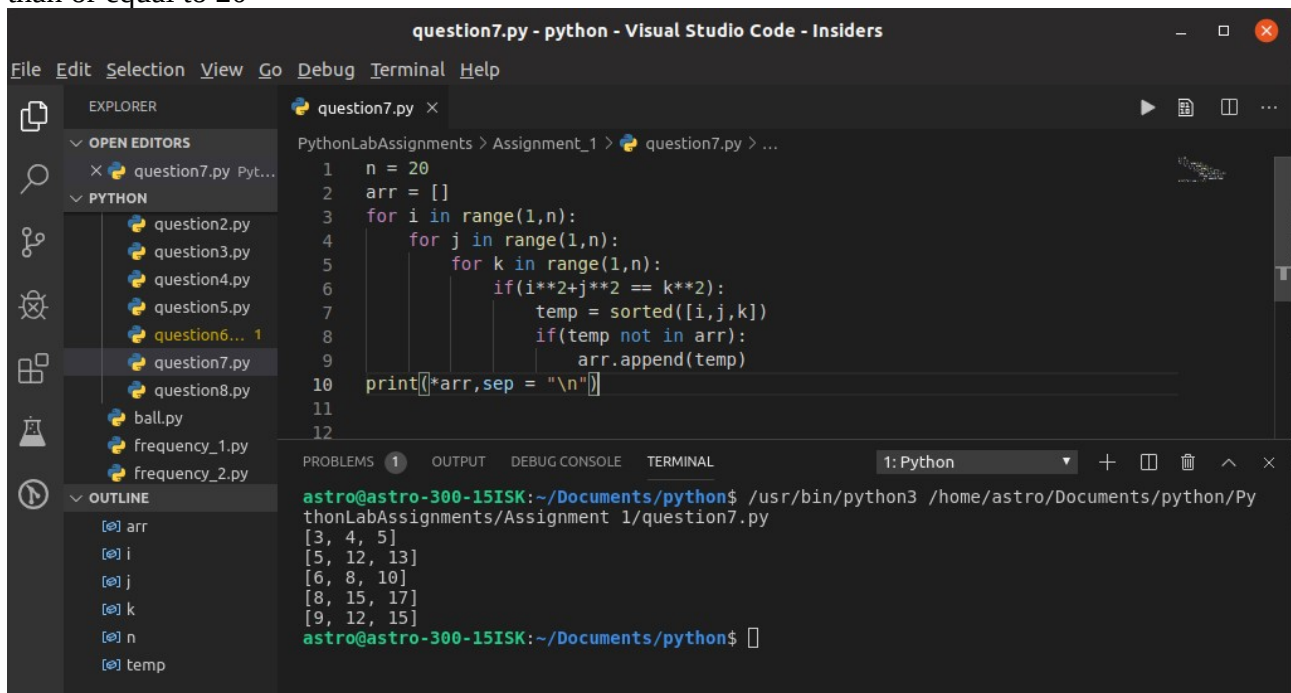
Using a while loop, produce a simple table of sines, cosines and tangents. Make the variable x range from 0 to 3 in steps of 0.1. For each value of x, print the value of `math.sin(x)`, `math.cos(x)` and `math.tan(x)`



```
question6.py - python - Visual Studio Code - Insiders
File Edit Selection View Go Debug Terminal Help
EXPLORER
OPEN EDITORS
question4.py Pyt...
question5.py Pyt...
question6.py ... 1
PYTHON
Assignment...
question1.py
question2.py
question3.py
question4.py
question5.py
question6... 1
question7.py
question8.py
OUTLINE
{} math
{} np
[i] i
[k] k
[val] val
PythonLabAssignments > Assignment_1 > question6.py > ...
1 # Code to print table of sine, cosine and tangent values
2 import math
3 import numpy as np
4 val = np.arange(0,3,0.1)
5 i = 0
6 k = len(val)
7 print("{0:^8} {1:^8} {2:^8} {3:^8}".format("Degrees"+chr(176),"Sine","Cosine"
8 |
9 while(i<k):
10     print("{0:^8.1f} {1:^8.2f} {2:^8.2f} {3:^8.2f}"
11         .format(val[i],math.sin(val[i]),math.cos(val[i]),math.tan(val[i])))
12     i += 1
1: Python
astro@astro-300-15ISK:~/Documents/python$ /usr/bin/python3 /home/astro/Documents/python/Py
thonLabAssignments/Assignment 1/question6.py
Degrees° Sine Cosine Tangent
0.0 0.00 1.00 0.00
0.1 0.10 1.00 0.10
0.2 0.20 0.98 0.20
0.3 0.30 0.96 0.31
0.4 0.39 0.92 0.42
0.5 0.48 0.88 0.55
0.6 0.56 0.83 0.68
0.7 0.64 0.76 0.84
0.8 0.72 0.70 1.03
0.9 0.78 0.62 1.26
1.0 0.84 0.54 1.56
```

Question – 7

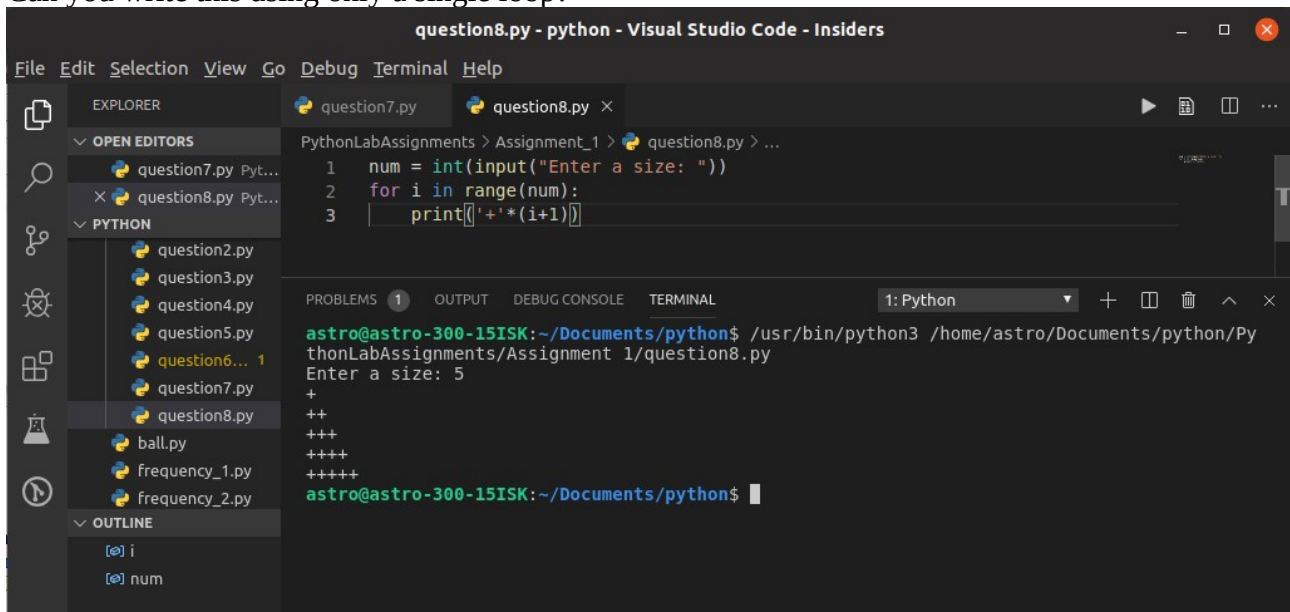
Using a series of nested for loops, find all Pythagorean triples consisting of positive integers less than or equal to 20



```
question7.py - python - Visual Studio Code - Insiders
File Edit Selection View Go Debug Terminal Help
EXPLORER
OPEN EDITORS
question7.py Pyt...
PYTHON
question2.py
question3.py
question4.py
question5.py
question6... 1
question7.py
question8.py
ball.py
frequency_1.py
frequency_2.py
OUTLINE
[i] arr
[i] i
[j] j
[k] k
[n] n
[temp] temp
PythonLabAssignments > Assignment_1 > question7.py > ...
1 n = 20
2 arr = []
3 for i in range(1,n):
4     for j in range(1,n):
5         for k in range(1,n):
6             if(i**2+j**2 == k**2):
7                 temp = sorted([i,j,k])
8                 if(temp not in arr):
9                     arr.append(temp)
10 print(*arr,sep = "\n")
11
12
1: Python
astro@astro-300-15ISK:~/Documents/python$ /usr/bin/python3 /home/astro/Documents/python/Py
thonLabAssignments/Assignment 1/question7.py
[3, 4, 5]
[5, 12, 13]
[6, 8, 10]
[8, 15, 17]
[9, 12, 15]
astro@astro-300-15ISK:~/Documents/python$
```


Question – 8

Write a program that reads an integer value n from the user, then produces n lines of output. The first line contains 1 star, the second 2 stars, and so on until the last line, which should have n stars. Can you write this using only a single loop?



The screenshot shows the Visual Studio Code editor with a Python file named `question8.py`. The code uses a single `for` loop to read an integer `num` from the user and print a series of stars. The output in the terminal shows the user entering 5, resulting in five lines of stars: 1, 2, 3, 4, and 5 stars respectively.

```
question8.py - python - Visual Studio Code - Insiders
File Edit Selection View Go Debug Terminal Help

EXPLORER
  OPEN EDITORS
    question7.py Pyt...
    question8.py Pyt...
  PYTHON
    question2.py
    question3.py
    question4.py
    question5.py
    question6... 1
    question7.py
    question8.py
    ball.py
    frequency_1.py
    frequency_2.py
  OUTLINE
    [0] i
    [0] num

PythonLabAssignments > Assignment_1 > question8.py > ...
1 num = int(input("Enter a size: "))
2 for i in range(num):
3     print('*'*(i+1))

PROBLEMS 1 OUTPUT DEBUG CONSOLE TERMINAL 1: Python
astro@astro-300-15ISK:~/Documents/python$ /usr/bin/python3 /home/astro/Documents/python/Py
thonLabAssignments/Assignment 1/question8.py
Enter a size: 5
+
++
+++
++++
+++++
astro@astro-300-15ISK:~/Documents/python$
```