

Solution - Task 04

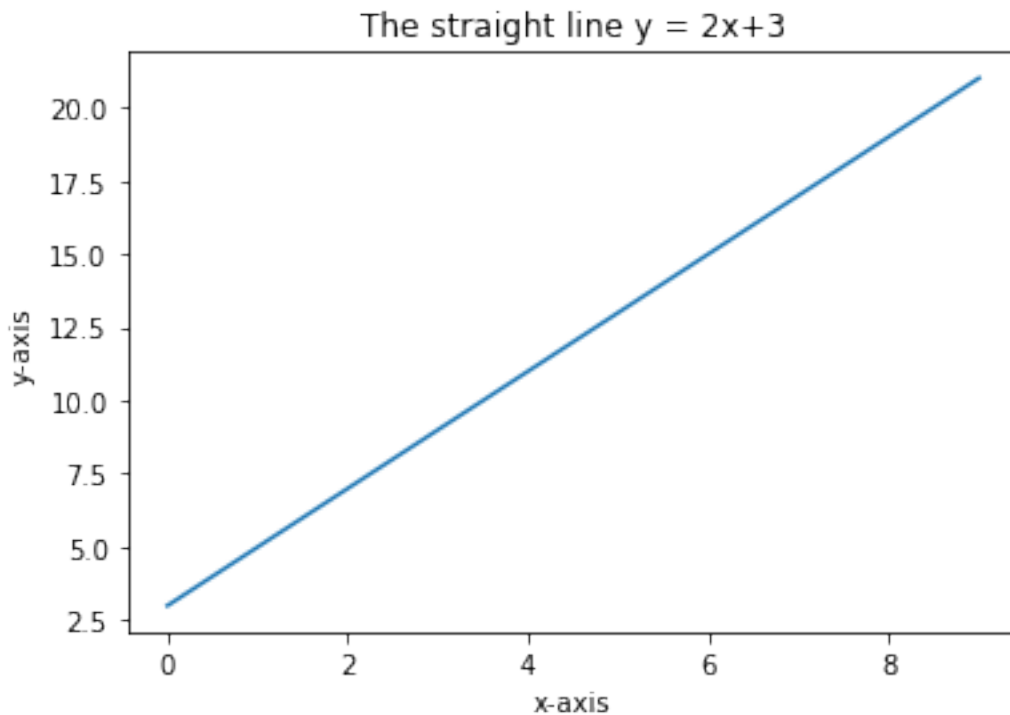
October 8, 2018

1. Ask user to input values of m and c and plot the line $y = mx + c$.

```
In [7]: import matplotlib.pyplot as plt
m = input("Slope m = ")
c = input("Y intercept c = ")
x = range(10)
y = [m*r + c for r in x]
plt.plot(x,y, '-')
plt.xlabel("x-axis")
plt.ylabel("y-axis")
plt.title("The straight line y = " + str(m) + "x" + "+" +str(c))
plt.show()
```

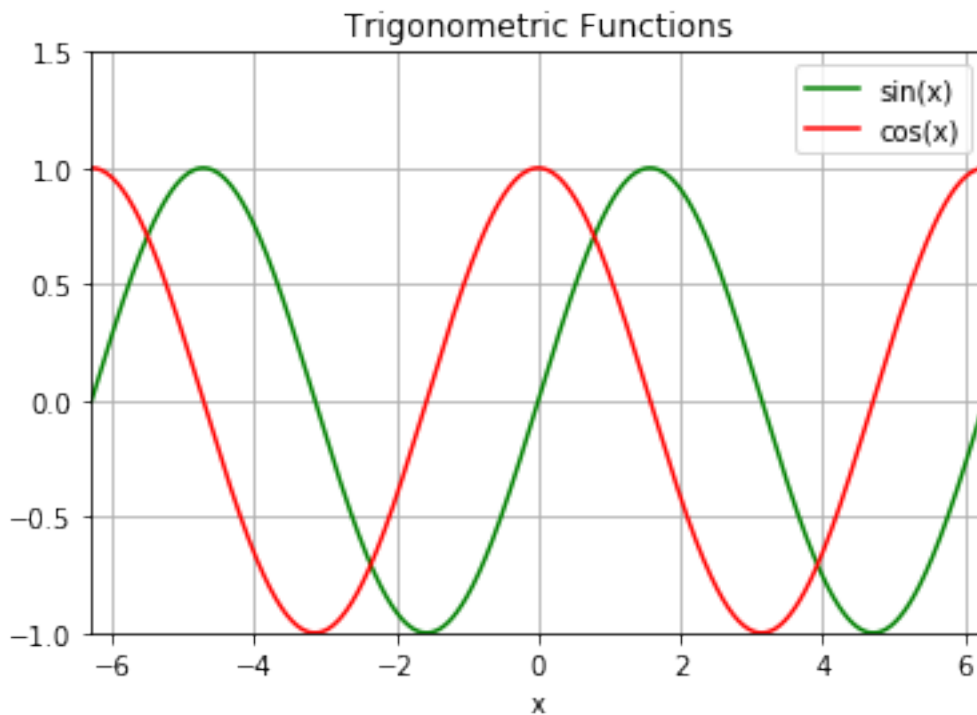
Slope $m = 2$

Y intercept $c = 3$



2. Plot following curves in one graph using in appropriate range : $y = \sin(x)$, $y = \cos(x)$.

```
In [31]: import matplotlib.pyplot as plt
import numpy as np
t = np.arange(-2*np.pi,2*np.pi,0.01)
s = np.sin(t)
c = np.cos(t)
plt.plot(t,s,'g', t,c,'r')
plt.xlabel('x')
plt.legend(('sin(x)', 'cos(x)'), loc = 'upper right')
plt.axis([-2*np.pi,2*np.pi,-1,1.5])
plt.grid(True)
plt.title('Trigonometric Functions')
plt.show()
```



3. Let $\pi(n)$ denote the number of primes p such that $p \leq n$. Let us call π the prime counting function. Plot π for $n \leq 10000$. Also, on the same graph plot $n/\log(n)$ against n .

```
In [45]: import matplotlib.pyplot as plt
def KnockMultiplesOf(p, L):
    for n in L:
```

```

        if (n%p == 0) and (n != p):
            L.remove(n)
    return L

primesupto = 10000
L = range(2, primesupto+1)
i = 0
p = 2

while p < 100:
    KnockMultiplesOf(p, L)
    i = i + 1
    p = L[i]

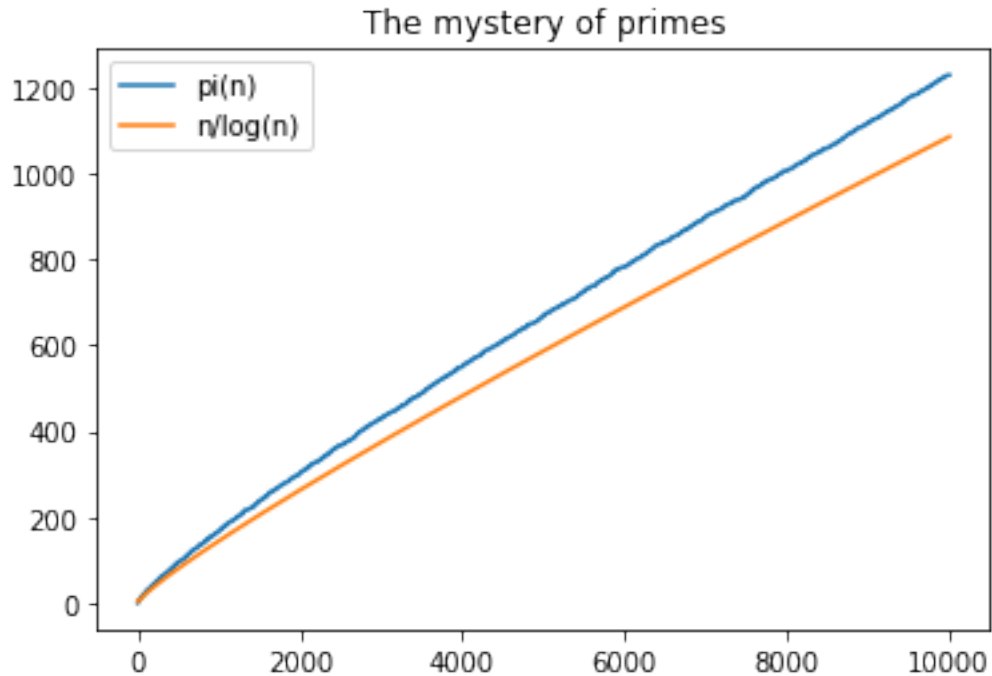
Pi = []

CurrentPi = len(L)

for n in range(primesupto-1, 0, -1):
    Pi.insert(0, CurrentPi)
    if n < L[CurrentPi-1]:
        L.pop()
        CurrentPi = CurrentPi - 1

Pi.insert(0,0)
Pi.insert(0,0)
X = range(2, primesupto)
Y = [n/np.log(n) for n in X]
pl.plot(Pi, '-', X, Y, '-')
pl.legend(('pi(n)', 'n/log(n)'))
pl.title('The mystery of primes')
pl.show()

```



4. The number of batchwise students at an institute is :

Year : Number

2014 : 153

2015 : 164

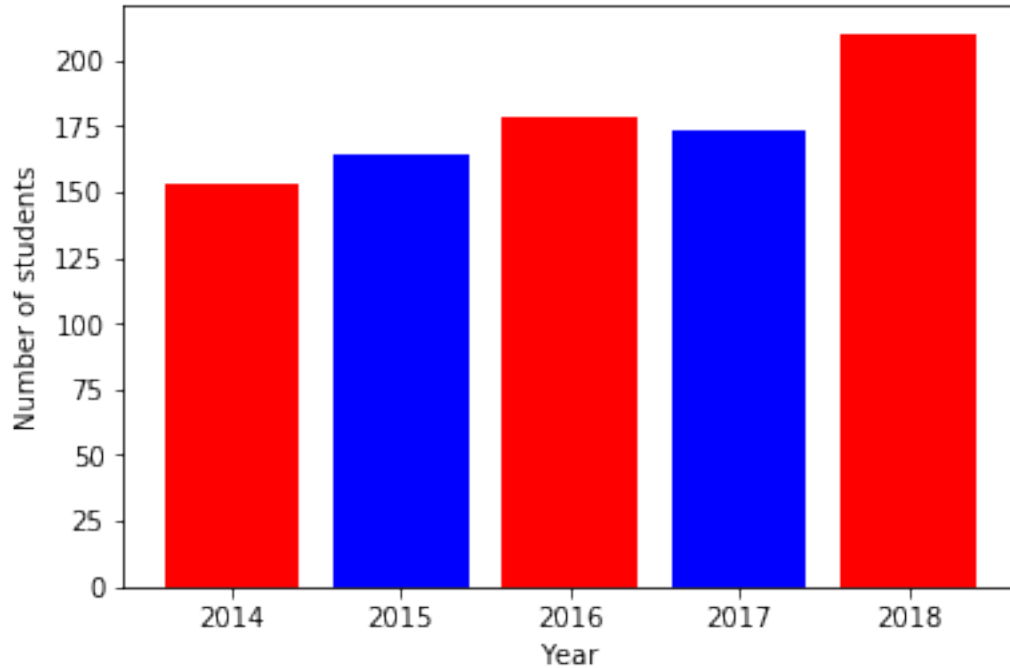
2016 : 178

2017 : 173

2018 : 210

Plot a bar chart to depict this information.

```
In [53]: import matplotlib.pyplot as pl
         xlocation = [1,2,3,4,5]
         number = [153,164,178,173,210]
         sticker = ['2014', '2015', '2016', '2017', '2018']
         pl.bar(xlocation, number, tick_label = sticker, width = 0.8, color = ['red', 'green', 'blue', 'orange', 'purple'])
         pl.xlabel('Year')
         pl.ylabel('Number of students')
         pl.show()
```



5. Composition of air is as follows: Nitrogen 78.09% , Oxygen 20.95% , Argon 0.93% , Carbon dioxide 0.04% . Plot a pie chart to depict this information.

```
In [61]: import matplotlib.pyplot as plt
gases = ['Nitrogen', 'Ar', 'Oxygen', 'CO2']
presence = [78.09, 0.93, 20.95, 0.04]
col = ['r', 'y', 'g', 'b']
plt.pie(presence, labels = gases, colors = col, startangle = 90, shadow = True)
plt.legend(loc = 'best')
plt.show()
```

