In [1]:

```
import numpy as np
nations = np.genfromtxt("nations.csv", delimiter=",", skip_header=True)
```

In [136]:

```
# How many people live on earth?

amtPeopleOnEarth = np.sum(nations, axis=0)[6]
print(amtPeopleOnEarth)
```

```
6482276104.0
```

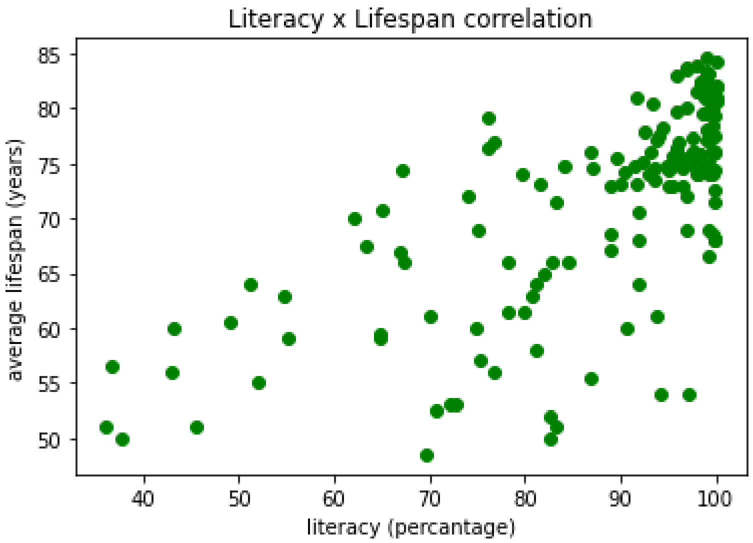
In [137]:

```
# What is the average life expectancy of the world population?

avgLifeExp = np.mean(nations, axis=0)[4]
print(avgLifeExp)
```

```
71.69006134969325
```

In [138]:

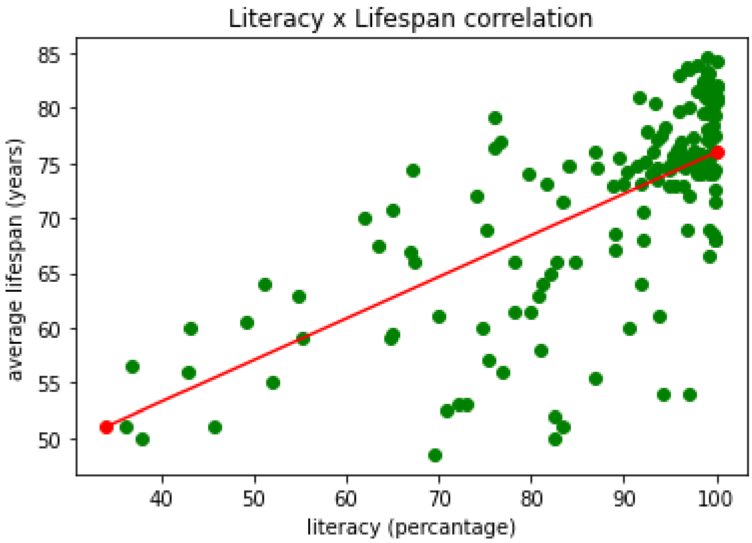
```
# Do people who can read live longer? Back up your claim with a diagram.

import matplotlib.pyplot as plt
plt.title("Literacy x Lifespan correlation")
plt.ylabel("average lifespan (years)")
plt.xlabel("literacy (percantage)")


plt.plot(nations[:,5]*100, nations[:,4], "og")

plt.show()
```



There appears to be a correlation between high literacy and a long life expectancy. Although, high literacy does not always come with a high average lifespan. But on the opposite side of the spectrum there are no low-lifespan countries with higher-end literacy.
In conclusion: A high literacy is essential but not sufficient for long average lifespans.

In [139]:

```
# Additionally, draw a straight line in the same plot, which approximately reflects the cou

plt.title("Literacy x Lifespan correlation")
plt.ylabel("average lifespan (years)")         # <--- same as before, since plot.show()
plt.xlabel("literacy (percantage)")

plt.plot(nations[:,5]*100, nations[:,4], "og")

x, y = [34, 100], [51, 76] # rough approximation
plt.plot(x, y, marker = "o", color= "r")
plt.show()
```



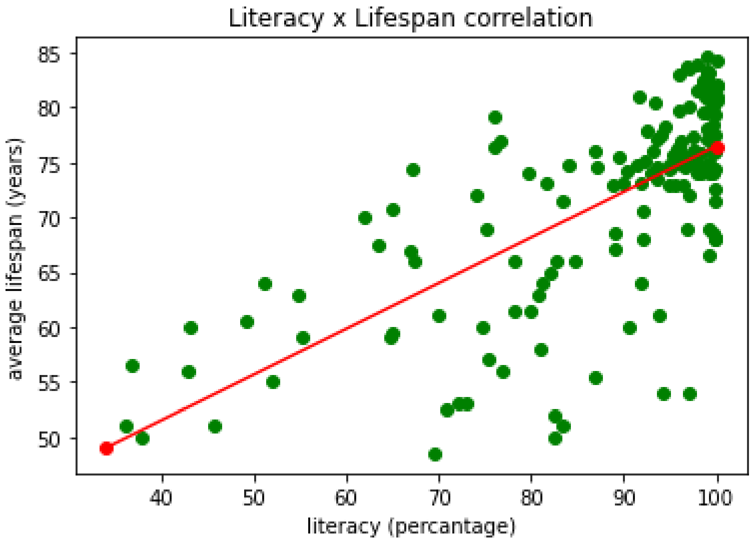
In [141]:

```
# Create the appropriate linear equation and store it in a function.

def calcLifeSpan(literacy):

    # y = mx+n
    m=(51-76)/(34-100) # numbers from above (change in height)
    n=51-34*m # numbers from above (shift on y axis)

    # final equation: y = 0.378*x + 38.12

    return literacy*m+n




# Calculate how well the line approximates the data points by calculating the root-mean-squ

import math

sum = 0
lits = nations[:,5] # literacy array
spans = nations[:,4] # lifespan array

for x in range(len(lits)): # for every data point
    sum += (calcLifeSpan(lits[x]*100)-spans[x])**2 # sum up squares of difference between e

rmse = math.sqrt(sum/len(lits)) # root the sum divided by amount of sum-ups

print("RMSE: ", rmse) # result
```

```
RMSE:  6.527986011830154
```

In [143]:

```
# Change the straight line by hand so that the error or deviation is smaller. Make a note o

plt.title("Literacy x Lifespan correlation")
plt.ylabel("average lifespan (years)")          # <--- same as before, since plot.show()
plt.xlabel("literacy (percantage)")

plt.plot(nations[:,5]*100, nations[:,4], "og")

x, y = [34, 100], [49, 76.5] # rough approximation
plt.plot(x, y, marker = "o", color= "r")
plt.show()


def calcLifeSpan(literacy):

    # y = mx+n
    m=(49-76.5)/(34-100) # numbers from above (change in height)
    n=49-34*m # numbers from above (shift on y axis)

    # final equation: y = 0,416*x + 34.83

    return literacy*m+n



import math

sum = 0
lits = nations[:,5] # literacy array
spans = nations[:,4] # lifespan array

for x in range(len(lits)): # for every data point
    sum += (calcLifeSpan(lits[x]*100)-spans[x])**2 # sum up squares of difference between e

rmse = math.sqrt(sum/len(lits)) # root the sum divided by amount of sum-ups

print("RMSE: ", rmse) # result
```



```
RMSE:  6.508700975976927
```

After trying for several minutes, I managed to achieve a slightly better result. Seems like the first approximation was already very close to the best I can come up with.

FINAL EQUATION:

y = 0.416*x + 34.83 RMSE   ~ 6.508700975976927

PREVIOUSLY:
y = 0.378*x + 38.12 RMSE   ~ 6.527986011830154