In [1]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import scipy as sc
from scipy.stats import linregress
```

In [10]:

```
df = pd.read_csv("task3.csv", sep=";")
df
```

Out[10]:

	УПАВ	Vводы	C	theta	l1	l2	l3	l4	r1	r2	r3	l
0	0.0	15.0	0.000000	118.3500	118.0	118.0	118.0	118.0	118.7	118.7	118.7	118
1	0.5	14.5	0.006667	112.5500	113.9	115.7	113.1	115.0	109.8	111.1	110.4	111
2	1.0	14.0	0.013333	109.8875	115.4	111.9	109.9	110.2	107.2	111.0	107.9	105
3	2.0	13.0	0.026667	100.1250	97.7	98.0	99.8	98.0	101.6	101.4	101.7	102
4	3.0	12.0	0.040000	90.8000	92.8	91.5	90.2	90.0	90.9	90.9	89.9	90
5	4.0	11.0	0.053333	91.1875	91.3	92.2	91.1	91.8	90.7	90.6	90.9	90
6	5.0	10.0	0.066667	93.4500	94.2	90.7	92.1	93.2	93.8	95.9	95.2	92
7	7.5	7.5	0.100000	83.5500	82.4	85.4	81.8	84.3	84.7	82.5	82.5	84
8	10.0	5.0	0.133333	78.7750	75.8	79.6	78.2	77.7	78.8	77.7	81.7	80
9	12.0	3.0	0.160000	76.7750	73.3	75.9	73.3	72.4	76.2	82.5	82.4	78
10	15.0	0.0	0.200000	72.8250	73.1	71.1	70.2	70.7	73.0	75.6	75.2	73

In [17]:

```
Wa = 72.5 * (1 + np.cos(118.35 * np.pi / 180))
Wa
```

Out[17]:

```
38.072911734381904
```

cosO = XcosO1 + (1-X)*cosO2 O1 = 5* np.pi / 180 O2 = df["tetha"].max() * np.pi / 180

cosO = X(cosO1 - cosO2) + cosO2 X = (cosO - cosO2)/(cosO1 - cosO2)

In [20]:

```
O1 = np.cos(5 * np.pi / 180)
O2 = np.cos(df["theta"].max() * np.pi / 180)

df["X"] = (np.cos(df["theta"] * np.pi / 180) - O2) / (O1 - O2)

df[["C", "X", "theta"]]
```

Out[20]:

	C	X	theta
0	0.000000	0.000000	118.3500
1	0.006667	0.062110	112.5500
2	0.013333	0.091555	109.8875
3	0.026667	0.203297	100.1250
4	0.040000	0.313309	90.8000
5	0.053333	0.308713	91.1875
6	0.066667	0.281893	93.4500
7	0.100000	0.399165	83.5500
8	0.133333	0.455129	78.7750
9	0.160000	0.478319	76.7750
10	0.200000	0.523536	72.8250

In [15]:

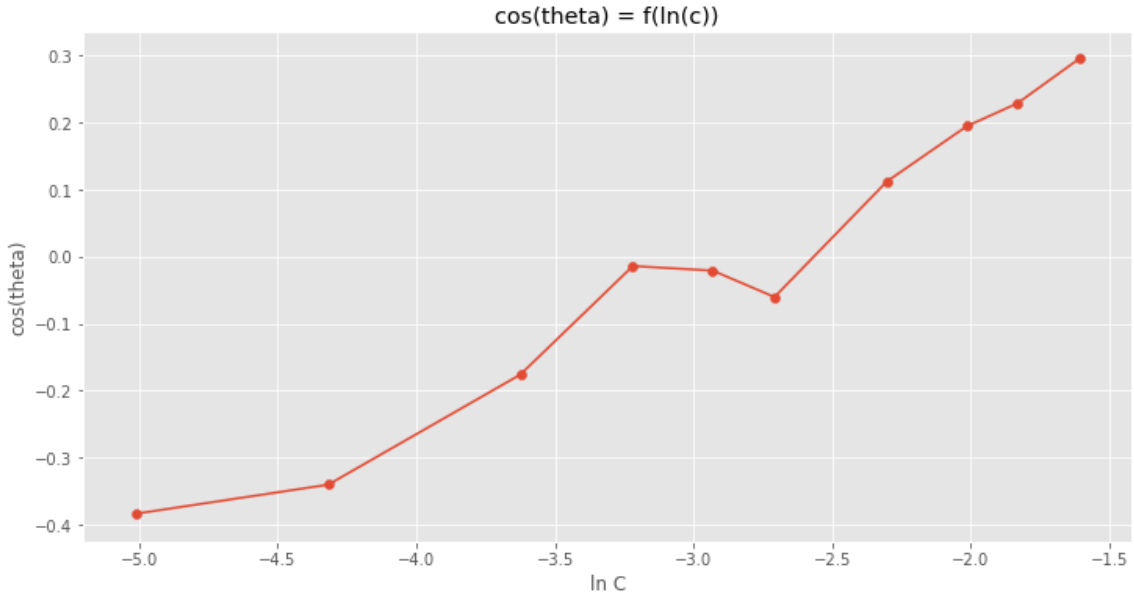
```
plt.figure(figsize=(12, 6))
plt.style.use("ggplot")
plt.title("cos(theta) = f(ln(c))")
plt.xlabel("ln C")
plt.ylabel("cos(theta)")
plt.plot(np.log(df["C"]), np.cos(df["theta"]*np.pi/180))
plt.scatter(np.log(df["C"]), np.cos(df["theta"]*np.pi/180))
```

```
/home/dpreer/.local/lib/python3.6/site-packages/ipykernel_launcher.p
y:6: RuntimeWarning: divide by zero encountered in log

/home/dpreer/.local/lib/python3.6/site-packages/ipykernel_launcher.p
y:7: RuntimeWarning: divide by zero encountered in log
  import sys
```

Out[15]:

```
<matplotlib.collections.PathCollection at 0x7facfd15d748>
```



In [ ]: