In [219]:

```
import pandas as pd
import numpy as np
from matplotlib import pyplot as plt
import datetime as dt
from sklearn.metrics import r2_score
```

In [27]:

```
subscribers = pd.read_csv('/home/amybirdee/jds_dilan_data/subscribers.csv', delimiter =
';')
```

In [28]:

```
subscribers.head()
```

Out[28]:

	event_date	event_type	user_id
0	2018-01-01	subscribe	2458151268
1	2018-01-01	subscribe	2458151267
2	2018-01-01	subscribe	2458151309
3	2018-01-01	subscribe	2458151358
4	2018-01-01	subscribe	2458151361

In [29]:

```
#group by date for chart and regression data
subscribers = subscribers.groupby('event_date').count().user_id.to_frame(name = 'count_
subscribers').reset_index()
```

In [187]:

```
#convert dates from object to datetime and then to numeric to use in regression analysi
s
subscribers['event_date'] = pd.to_datetime(subscribers.event_date)
subscribers['event_date'] = subscribers['event_date'].map(dt.datetime.toordinal)
subscribers.head()
```

Out[187]:

	event_date	count_subscribers
0	736695	60
1	736696	115
2	736697	181
3	736698	47
4	736699	42

In [188]:

```
x = subscribers['event_date']
y = subscribers['count_subscribers']
```

In [189]:

```
#linear regression
model = np.polyfit(x, y, 2)
predict = np.poly1d(model)
```

In [190]:

```
subscriber_prediction = predict(x)
```

In [191]:

```
#converting dates back to date format for chart
date_1 = '2018-01-01'
date_2 = '2018-03-30'
my_dates = pd.date_range(date_1, date_2).tolist()
```

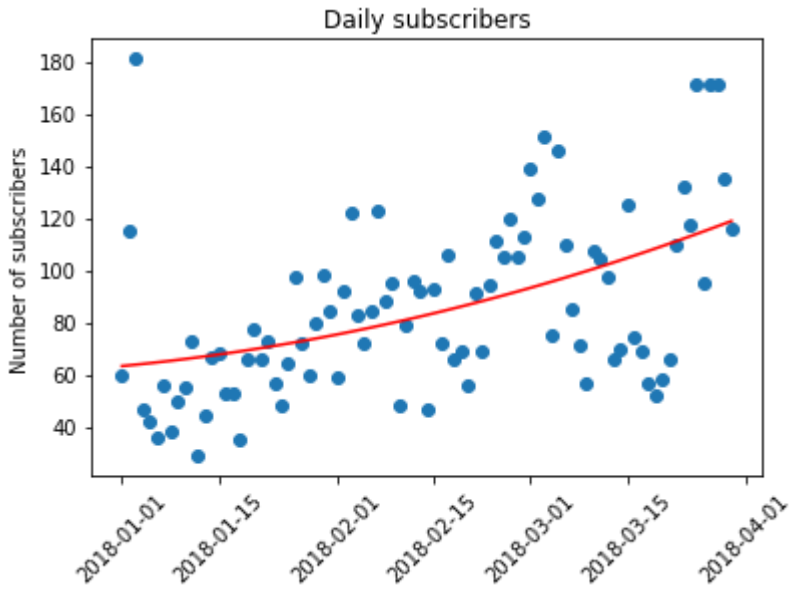
In [220]:

```
#chart shows existing date and regression line
ax = plt.subplot()
plt.scatter(my_dates, y)
plt.plot(my_dates, subscriber_prediction, color = 'red')
plt.xticks(rotation = 45)
plt.ylabel('Number of subscribers')
plt.title('Daily subscribers')
```

```
/usr/lib/python3/dist-packages/pandas/plotting/_compat.py:57: MatplotlibDe
precationWarning:
The compare_versions function was deprecated in Matplotlib 3.2 and will be
removed two minor releases later.
  return matplotlib.compare_versions('2.0.0', matplotlib.__version__)
```

Out[220]:

```
Text(0.5, 1.0, 'Daily subscribers')
```



In [193]:

```
#predicting the future - creating a dataframe containing dates for 4 weeks ahead
future_date_1 = '2018-04-01'
future_date_2 = '2018-04-30'
future_dates = pd.DataFrame(pd.date_range(future_date_1, future_date_2))
future_dates.columns = ['date']
```

In [194]:

```
#converting dates to integer to use in model
future_dates['date'] = future_dates['date'].map(dt.datetime.toordinal)
```

In [206]:

```
future_dates.tail()
```

Out[206]:

	date
25	736810
26	736811
27	736812
28	736813
29	736814

In [196]:

```
#running model for future dates
x_future = future_dates.date
y_future = predict(x_future)
```

In [197]:

```
model_future = np.polyfit(x_future, y_future, 2)
predict_future = np.poly1d(model_future)
```

In [198]:

```
future_subscribers = predict_future(x_future)
```

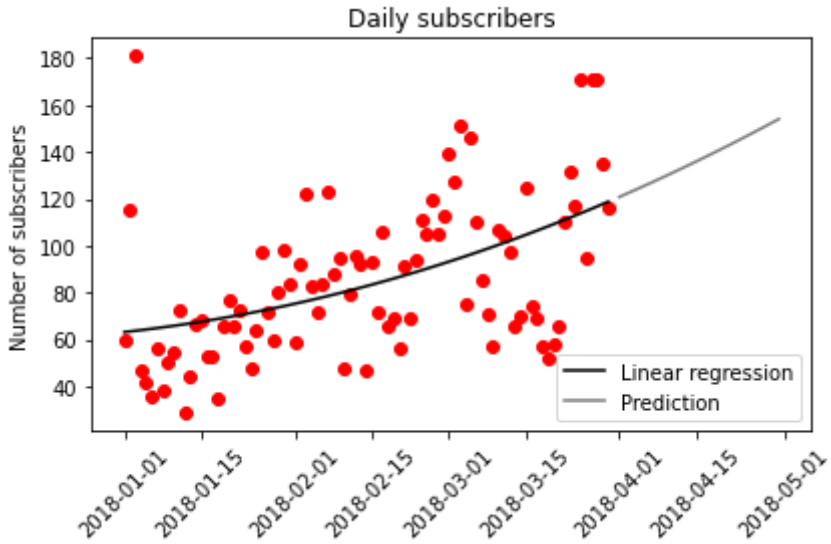
In [214]:

```
#creating new date list for 4 weeks' time for chart
future_date_1 = '2018-04-01'
future_date_2 = '2018-04-30'
new_dates = pd.date_range(future_date_1, future_date_2).tolist()
```

In [223]:

```
#chart shows existing data and future regression line
plt.scatter(my_dates, y, color = 'red')
plt.plot(my_dates, subscriber_prediction, color = 'black', label = 'Linear regression')
plt.plot(new_dates, future_subscribers, color = 'grey', label = 'Prediction')
plt.legend()
plt.xticks(rotation = 45)
plt.ylabel('Number of subscribers')
plt.title('Daily subscribers')
plt.tight_layout()
plt.savefig('subscribers.jpg')
```

```
/usr/lib/python3/dist-packages/pandas/plotting/_compat.py:57: MatplotlibDe
precationWarning:
The compare_versions function was deprecated in Matplotlib 3.2 and will be
removed two minor releases later.
  return matplotlib.compare_versions('2.0.0', matplotlib.__version__)
```



In [208]:

```
#prediction for 4 weeks' time (the 736814 is 2018-04-30 coverted to integer as shown in
the future_date.tail()
#command above)
predict_future(736814)
```

Out[208]:

```
154.04082536697388
```

In [210]:

```
#checking R2 score - data points are quite widely scattered and this is likely causing
 the low R2 score
r2_score(y, predict(x))
```

Out[210]:

```
0.24038642584493786
```

In [211]:

```
#checking R2 score for future - this score is probably very unlikely!!
r2_score (y_future, predict_future(x_future))
```

Out[211]:

```
0.9999999999999688
```

In [ ]:

```

```