In [2]:

```python
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn import preprocessing,svm
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
```

In [3]:

```
df=pd.read_csv(r"C:\Users\teppa\Desktop\AHISAI\bottle.csv")
df
```

```
C:\Users\teppa\AppData\Local\Temp\ipykernel_1224\3415337971.py:1: DtypeWarnin
g: Columns (47,73) have mixed types. Specify dtype option on import or set lo
w_memory=False.
  df=pd.read_csv(r"C:\Users\teppa\Desktop\AHISAI\bottle.csv")
```

Out[3]:

	Cst_Cnt	Btl_Cnt	Sta_ID	Depth_ID	Depthm	T_degC	Salnty	O2ml_L	STheta	O2S
0	1	1	054.0 056.0	19-4903CR-HY-060-0930-05400560-0000A-3	0	10.500	33.4400	NaN	25.64900	Na
1	1	2	054.0 056.0	19-4903CR-HY-060-0930-05400560-0008A-3	8	10.460	33.4400	NaN	25.65600	Na
2	1	3	054.0 056.0	19-4903CR-HY-060-0930-05400560-0010A-7	10	10.460	33.4370	NaN	25.65400	Na
3	1	4	054.0 056.0	19-4903CR-HY-060-0930-05400560-0019A-3	19	10.450	33.4200	NaN	25.64300	Na
4	1	5	054.0 056.0	19-4903CR-HY-060-0930-05400560-0020A-7	20	10.450	33.4210	NaN	25.64300	Na
...	...	...	...	...	...	...	...	...	...	
864858	34404	864859	093.4 026.4	20-1611SR-MX-310-2239-09340264-0000A-7	0	18.744	33.4083	5.805	23.87055	108.
864859	34404	864860	093.4 026.4	20-1611SR-MX-310-2239-09340264-0002A-3	2	18.744	33.4083	5.805	23.87072	108.
864860	34404	864861	093.4 026.4	20-1611SR-MX-310-2239-09340264-0005A-3	5	18.692	33.4150	5.796	23.88911	108.
864861	34404	864862	093.4 026.4	20-1611SR-MX-310-2239-09340264-0010A-3	10	18.161	33.4062	5.816	24.01426	107.

	Cst_Cnt	Btl_Cnt	Sta_ID	Depth_ID	Depthm	T_degC	Salnty	O2ml_L	STheta	O2S
864862	34404	864863	093.4 026.4	20-1611SR-MX-310-2239-09340264-0015A-3	15	17.533	33.3880	5.774	24.15297	105.

864863 rows × 74 columns

```
In [4]:  df=df[['Salnty','T_degC']]
         df.columns=['sal','tem']
```

```
In [5]:  df.head()
```

Out[5]:

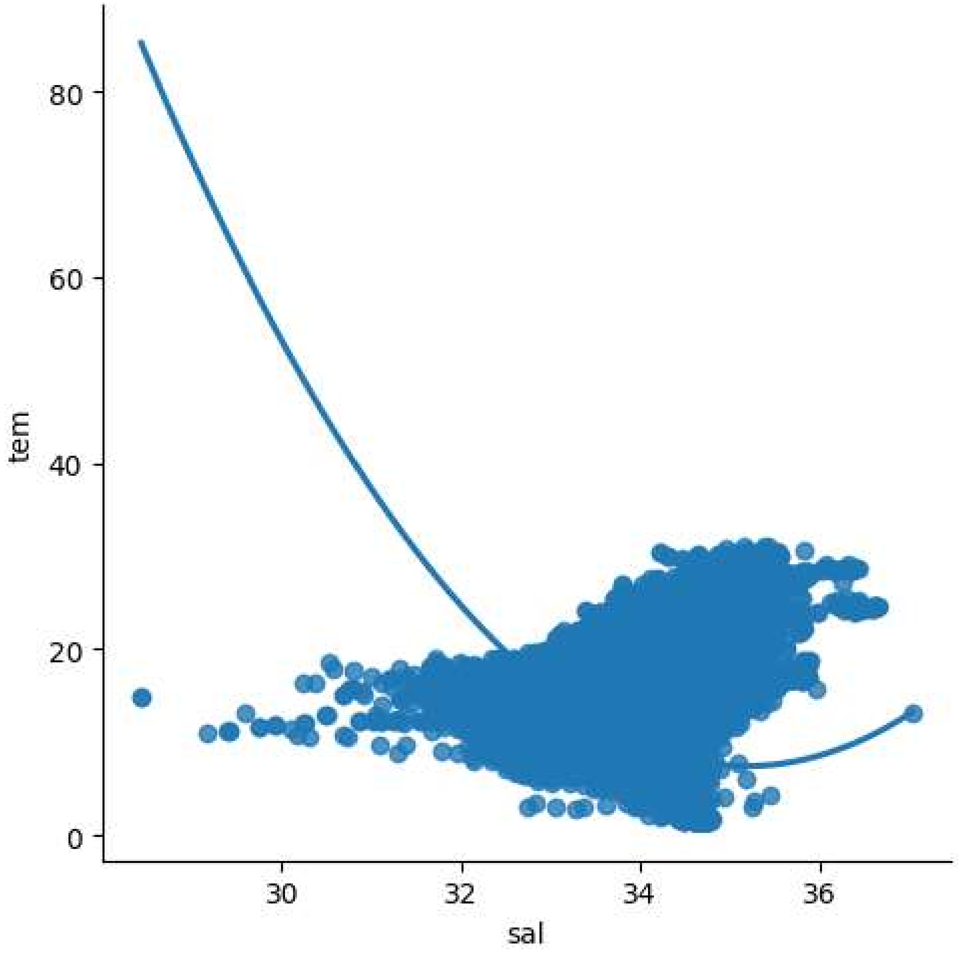
	sal	tem
0	33.440	10.50
1	33.440	10.46
2	33.437	10.46
3	33.420	10.45
4	33.421	10.45

In [6]:

```
sns.lmplot(x='sal',y='tem',data=df,order=2,ci=None)
```

Out[6]:

```
<seaborn.axisgrid.FacetGrid at 0x17c6cf08790>
```



In [7]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 864863 entries, 0 to 864862
Data columns (total 2 columns):
 #   Column  Non-Null Count   Dtype  
---  ------  --------------   -----  
 0   sal     817509 non-null  float64
 1   tem     853900 non-null  float64
dtypes: float64(2)
memory usage: 13.2 MB
```

In [8]:

```python
df.describe()
```

Out[8]:

	sal	tem
count	817509.000000	853900.000000
mean	33.840350	10.799677
std	0.461843	4.243825
min	28.431000	1.440000
25%	33.488000	7.680000
50%	33.863000	10.060000
75%	34.196900	13.880000
max	37.034000	31.140000

In [9]:

```python
df.fillna(method='ffill')
```

Out[9]:

	sal	tem
0	33.4400	10.500
1	33.4400	10.460
2	33.4370	10.460
3	33.4200	10.450
4	33.4210	10.450
...	...	...
864858	33.4083	18.744
864859	33.4083	18.744
864860	33.4150	18.692
864861	33.4062	18.161
864862	33.3880	17.533

864863 rows × 2 columns

In [10]:

```python
df.fillna(value=0,inplace=True)
```

```
C:\Users\teppa\AppData\Local\Temp\ipykernel_1224\1434098079.py:1: SettingWith
CopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/s
table/user_guide/indexing.html#returning-a-view-versus-a-copy (https://panda
s.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-ver
sus-a-copy)
  df.fillna(value=0,inplace=True)
```

In [11]:

```
df.isnull().sum()
```

Out[11]:

```
sal    0
tem    0
dtype: int64
```

In [12]:

```
x=np.array(df['sal']).reshape(-1,1)
y=np.array(df['tem']).reshape(-1,1)
```

In [13]:

```
df.dropna(inplace=True)
```

```
C:\Users\teppa\AppData\Local\Temp\ipykernel_1224\1379821321.py:1: SettingWith
CopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/s
table/user_guide/indexing.html#returning-a-view-versus-a-copy (https://panda
s.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-ver
sus-a-copy)
  df.dropna(inplace=True)
```

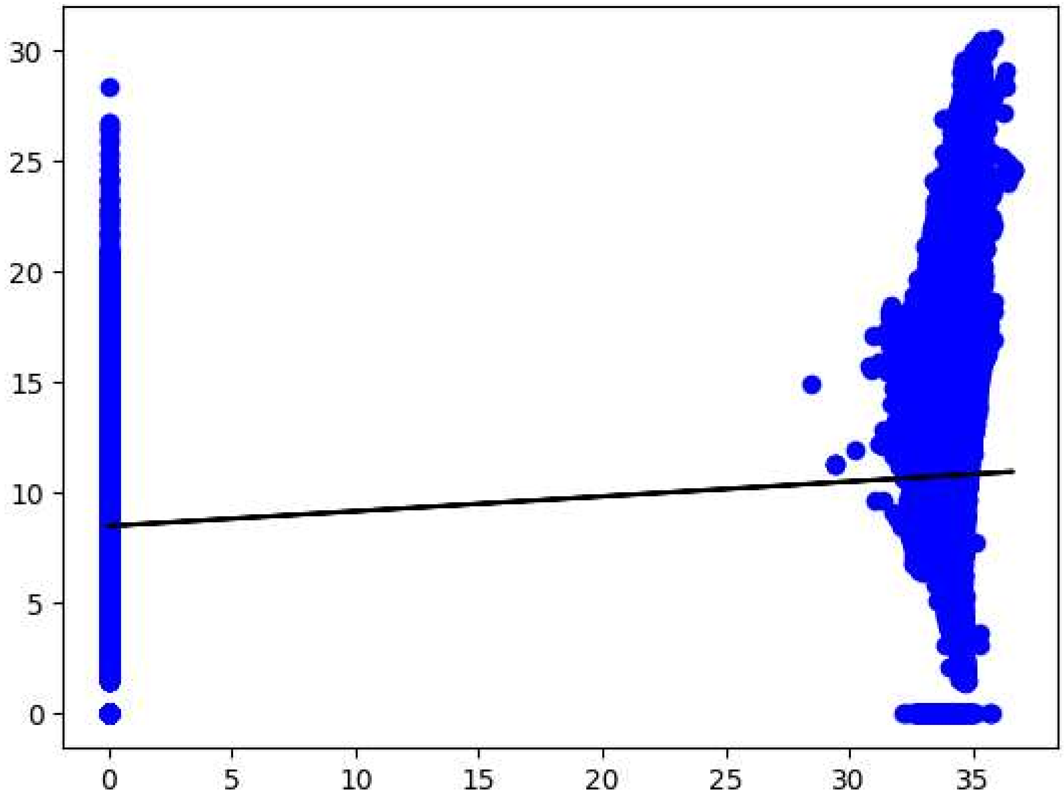
In [14]:

```
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.25)
reg=LinearRegression()
reg.fit(x_train,y_train)
print(reg.score(x_test,y_test))
```

```
0.014401697881500253
```

In [15]:

```
y_pred=reg.predict(x_test)
plt.scatter(x_test,y_test,color='b')
plt.plot(x_test,y_pred,color='k')
plt.show()
```

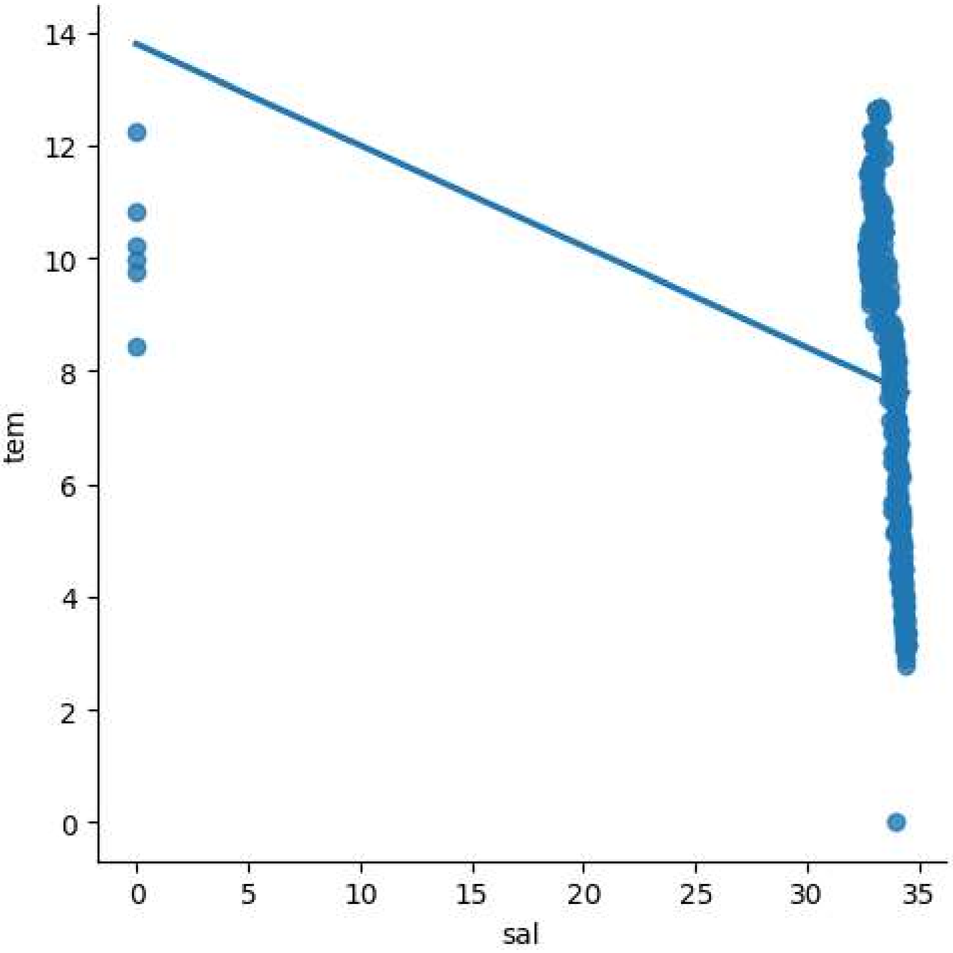


In [16]:

```
df500=df[:][:500]
sns.lmplot(x='sal',y='tem',data=df500,order=1,ci=None)
```

Out[16]:

```
<seaborn.axisgrid.FacetGrid at 0x17c6cf90d60>
```



In [17]:

```
from sklearn.linear_model import LinearRegression
from sklearn.metrics import r2_score
model=LinearRegression()
model.fit(x_train,y_train)
y_pred=model.predict(x_test)
r2=r2_score(y_test,y_pred)
print("R2 score:",r2)
```

```
R2 score: 0.014401697881500253
```