Desktop/ML/ML_LAB/ | Untitled - Jupyter Notebook | New Tab

localhost:8888/notebooks/Desktop/ML/ML_LAB/Untitled.ipynb?kernel_name=python3

jupyter Untitled Last Checkpoint: 20 minutes ago (unsaved changes) Logout

File Edit View Insert Cell Kernel Help Trusted Python 3 (ipykernel)

Run Code

In [16]:
```
# ASSIGNMENT - 2
import pandas as pd
```

In [17]:
```
d = pd.read_csv('temperatures.csv')
d
```

Out[17]:

	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	JAN-FEB	MAR-MAY	JUN-SEP	OCT-DEC
0	1901	22.40	24.14	29.07	31.91	33.41	33.18	31.21	30.39	30.47	29.97	27.31	24.49	28.96	23.27	31.46	31.27	27.25
1	1902	24.93	26.58	29.77	31.78	33.73	32.91	30.92	30.73	29.80	29.12	26.31	24.04	29.22	25.75	31.76	31.09	26.49
2	1903	23.44	25.03	27.83	31.39	32.91	33.00	31.34	29.98	29.85	29.04	26.08	23.65	28.47	24.24	30.71	30.92	26.26
3	1904	22.50	24.73	28.21	32.02	32.64	32.07	30.36	30.09	30.04	29.20	26.36	23.63	28.49	23.62	30.95	30.66	26.40
4	1905	22.00	22.83	26.68	30.01	33.32	33.25	31.44	30.68	30.12	30.67	27.52	23.82	28.30	22.25	30.00	31.33	26.57
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
112	2013	24.56	26.59	30.62	32.66	34.46	32.44	31.07	30.76	31.04	30.27	27.83	25.37	29.81	25.58	32.58	31.33	27.83
113	2014	23.83	25.97	28.95	32.74	33.77	34.15	31.85	31.32	30.68	30.29	28.05	25.08	29.72	24.90	31.82	32.00	27.81
114	2015	24.58	26.89	29.07	31.87	34.09	32.48	31.88	31.52	31.55	31.04	28.10	25.67	29.90	25.74	31.68	31.87	28.27
115	2016	26.94	29.72	32.62	35.38	35.72	34.03	31.64	31.79	31.66	31.98	30.11	28.01	31.63	28.33	34.57	32.28	30.03
116	2017	26.45	29.46	31.60	34.95	35.84	33.82	31.88	31.72	32.22	32.29	29.60	27.18	31.42	27.95	34.13	32.41	29.69

117 rows × 18 columns

In [18]:
```
d.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 117 entries, 0 to 116
Data columns (total 18 columns):
 #   Column   Non-Null Count  Dtype
---  ------   --------------  -----
 0   YEAR     117 non-null    int64
 1   JAN      117 non-null    float64
```

Desktop/ML/ML_LAB/ | Untitled - Jupyter Notebook | New Tab

localhost:8888/notebooks/Desktop/ML/ML_LAB/Untitled.ipynb?kernel_name=python3

jupyter **Untitled** Last Checkpoint: 20 minutes ago (unsaved changes) Logout

File Edit View Insert Cell Kernel Help Trusted Python 3 (ipykernel)

Run Code

In [18]:
```
d.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 117 entries, 0 to 116
Data columns (total 18 columns):
 #   Column   Non-Null Count  Dtype
---  ------   --------------  -----
 0   YEAR     117 non-null    int64
 1   JAN      117 non-null    float64
 2   FEB      117 non-null    float64
 3   MAR      117 non-null    float64
 4   APR      117 non-null    float64
 5   MAY      117 non-null    float64
 6   JUN      117 non-null    float64
 7   JUL      117 non-null    float64
 8   AUG      117 non-null    float64
 9   SEP      117 non-null    float64
 10  OCT      117 non-null    float64
 11  NOV      117 non-null    float64
 12  DEC      117 non-null    float64
 13  ANNUAL   117 non-null    float64
 14  JAN-FEB  117 non-null    float64
 15  MAR-MAY  117 non-null    float64
 16  JUN-SEP  117 non-null    float64
 17  OCT-DEC  117 non-null    float64
dtypes: float64(17), int64(1)
memory usage: 16.6 KB
```

In [19]:
```
d.describe()
```

Out[19]:

	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	
count	117.000000	117.000000	117.000000	117.000000	117.000000	117.000000	117.000000	117.000000	117.000000	117.000000	117.000000	117.000000	117.00
mean	1959.000000	23.687436	25.597863	29.085983	31.975812	33.565299	32.774274	31.035897	30.507692	30.486752	29.766581	27.285470	24.60
std	33.919021	0.834588	1.150757	1.068451	0.889478	0.724905	0.633132	0.468818	0.476312	0.544295	0.705492	0.714518	0.78
min	1901.000000	22.000000	22.830000	26.680000	30.010000	31.930000	31.100000	29.760000	29.310000	29.070000	27.900000	25.700000	23.02
25%	1930.000000	23.100000	24.780000	28.370000	31.460000	33.110000	32.340000	30.740000	30.180000	30.120000	29.380000	26.790000	24.04

Desktop/ML/ML_LAB/ | Untitled - Jupyter Notebook | New Tab

localhost:8888/notebooks/Desktop/ML/ML_LAB/Untitled.ipynb?kernel_name=python3

jupyter Untitled Last Checkpoint: 21 minutes ago (unsaved changes) Logout

File Edit View Insert Cell Kernel Help Trusted Python 3 (ipykernel)

Run Code

In [19]:
```
d.describe()
```

Out[19]:

	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	
count	117.000000	117.000000	117.000000	117.000000	117.000000	117.000000	117.000000	117.000000	117.000000	117.000000	117.000000	117.000000	117.00
mean	1959.000000	23.687436	25.597863	29.085983	31.975812	33.565299	32.774274	31.035897	30.507692	30.486752	29.766581	27.285470	24.60
std	33.919021	0.834588	1.150757	1.068451	0.889478	0.724905	0.633132	0.468818	0.476312	0.544295	0.705492	0.714518	0.78
min	1901.000000	22.000000	22.830000	26.680000	30.010000	31.930000	31.100000	29.760000	29.310000	29.070000	27.900000	25.700000	23.02
25%	1930.000000	23.100000	24.780000	28.370000	31.460000	33.110000	32.340000	30.740000	30.180000	30.120000	29.380000	26.790000	24.04
50%	1959.000000	23.680000	25.480000	29.040000	31.950000	33.510000	32.730000	31.000000	30.540000	30.520000	29.780000	27.300000	24.66
75%	1988.000000	24.180000	26.310000	29.610000	32.420000	34.030000	33.180000	31.330000	30.760000	30.810000	30.170000	27.720000	25.11
max	2017.000000	26.940000	29.720000	32.620000	35.380000	35.840000	34.480000	32.760000	31.840000	32.220000	32.290000	30.110000	28.01

In [20]:
```
d.corr()
```

Out[20]:

	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	JAN-FEB
YEAR	1.000000	0.575499	0.647066	0.553886	0.540662	0.407648	0.371840	0.478512	0.654138	0.664008	0.589073	0.697887	0.732222	0.801129	0.679869
JAN	0.575499	1.000000	0.647017	0.457081	0.594674	0.365236	0.292855	0.339337	0.459944	0.499764	0.480695	0.526615	0.595902	0.749880	0.874226
FEB	0.647066	0.647017	1.000000	0.589088	0.548803	0.377722	0.341302	0.418956	0.503188	0.472755	0.466916	0.519595	0.619320	0.792541	0.928731
MAR	0.553886	0.457081	0.589088	1.000000	0.618621	0.387756	0.228349	0.232647	0.382344	0.370066	0.312226	0.498202	0.523316	0.689205	0.584612
APR	0.540662	0.594674	0.548803	0.618621	1.000000	0.563317	0.299866	0.286052	0.490668	0.437970	0.473873	0.538037	0.579775	0.770596	0.643942
MAY	0.407648	0.365236	0.377722	0.387756	0.563317	1.000000	0.274521	0.299072	0.473171	0.347289	0.468993	0.482822	0.444695	0.609015	0.403316
JUN	0.371840	0.292855	0.341302	0.228349	0.299866	0.274521	1.000000	0.480925	0.504354	0.305761	0.380782	0.419968	0.366242	0.520189	0.351115
JUL	0.478512	0.339337	0.418956	0.232647	0.286052	0.299072	0.480925	1.000000	0.622985	0.531865	0.568341	0.535413	0.440813	0.588454	0.423876
AUG	0.654138	0.459944	0.503188	0.382344	0.490668	0.473171	0.504354	0.622985	1.000000	0.680212	0.661177	0.588961	0.595330	0.755384	0.534818
SEP	0.664008	0.499764	0.472755	0.370066	0.437970	0.347289	0.305761	0.531865	0.680212	1.000000	0.680744	0.683866	0.629223	0.730756	0.529533
OCT	0.589073	0.480695	0.466916	0.312226	0.473873	0.468993	0.380782	0.568341	0.661177	0.680744	1.000000	0.770277	0.719305	0.768170	0.506640

Desktop/ML/ML_LAB/ | Untitled - Jupyter Notebook | New Tab

localhost:8888/notebooks/Desktop/ML/ML_LAB/Untitled.ipynb?kernel_name=python3

jupyter **Untitled** Last Checkpoint: 21 minutes ago (unsaved changes) Logout

File Edit View Insert Cell Kernel Help Trusted Python 3 (ipykernel)

Run Code

	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	JAN-FEB
YEAR	1.000000	0.575499	0.647066	0.553886	0.540662	0.407648	0.371840	0.478512	0.654138	0.664008	0.589073	0.697887	0.732222	0.801129	0.679869
JAN	0.575499	1.000000	0.647017	0.457081	0.594674	0.365236	0.292855	0.339337	0.459944	0.499764	0.480695	0.526615	0.595902	0.749880	0.874226
FEB	0.647066	0.647017	1.000000	0.589088	0.548803	0.377722	0.341302	0.418956	0.503188	0.472755	0.466916	0.519595	0.619320	0.792541	0.928731
MAR	0.553886	0.457081	0.589088	1.000000	0.618621	0.387756	0.228349	0.232647	0.382344	0.370066	0.312226	0.498202	0.523316	0.689205	0.584612
APR	0.540662	0.594674	0.548803	0.618621	1.000000	0.563317	0.299866	0.286052	0.490668	0.437970	0.473873	0.538037	0.579775	0.770596	0.643942
MAY	0.407648	0.365236	0.377722	0.387756	0.563317	1.000000	0.274521	0.299072	0.473171	0.347289	0.468993	0.482822	0.444695	0.609015	0.403316
JUN	0.371840	0.292855	0.341302	0.228349	0.299866	0.274521	1.000000	0.480925	0.504354	0.305761	0.380782	0.419968	0.366242	0.520189	0.351115
JUL	0.478512	0.339337	0.418956	0.232647	0.286052	0.299072	0.480925	1.000000	0.622985	0.531865	0.568341	0.535413	0.440813	0.588454	0.423876
AUG	0.654138	0.459944	0.503188	0.382344	0.490668	0.473171	0.504354	0.622985	1.000000	0.680212	0.661177	0.588961	0.595330	0.755384	0.534818
SEP	0.664008	0.499764	0.472755	0.370066	0.437970	0.347289	0.305761	0.531865	0.680212	1.000000	0.680744	0.683866	0.629223	0.730756	0.529533
OCT	0.589073	0.480695	0.466916	0.312226	0.473873	0.468993	0.380782	0.568341	0.661177	0.680744	1.000000	0.770277	0.719305	0.768170	0.506640
NOV	0.697887	0.526615	0.519595	0.498202	0.538037	0.482822	0.419968	0.535413	0.588961	0.683866	0.770277	1.000000	0.782075	0.812868	0.568893
DEC	0.732222	0.595902	0.619320	0.523316	0.579775	0.444695	0.366242	0.440813	0.595330	0.629223	0.719305	0.782075	1.000000	0.843660	0.663719
ANNUAL	0.801129	0.749880	0.792541	0.689205	0.770596	0.609015	0.520189	0.588454	0.755384	0.730756	0.768170	0.812868	0.843660	1.000000	0.849828
JAN-FEB	0.679869	0.874226	0.928731	0.584612	0.643942	0.403316	0.351115	0.423876	0.534818	0.529533	0.506640	0.568893	0.663719	0.849828	1.000000
MAR-MAY	0.640438	0.575734	0.635904	0.848637	0.878402	0.708221	0.341301	0.321388	0.560118	0.485397	0.522917	0.620161	0.643015	0.853277	0.675918
JUN-SEP	0.677061	0.496515	0.544527	0.380640	0.474542	0.431314	0.749132	0.799602	0.866202	0.778875	0.705733	0.692585	0.634747	0.810786	0.575513
OCT-DEC	0.749792	0.607752	0.609839	0.505879	0.596943	0.503445	0.409325	0.541023	0.665040	0.734650	0.888144	0.913522	0.922692	0.897046	0.661805

In [21]:
```
# splitting training and testing data
from sklearn.linear_model import LinearRegression
from sklearn.model_selection import train_test_split
import matplotlib.pyplot as plt
```

Desktop/ML/ML_LAB/ | Untitled - Jupyter Notebook | New Tab

localhost:8888/notebooks/Desktop/ML/ML_LAB/Untitled.ipynb?kernel_name=python3

jupyter **Untitled** Last Checkpoint: 21 minutes ago (unsaved changes) Logout

File Edit View Insert Cell Kernel Help Trusted Python 3 (ipykernel)

Run Code

In [21]:
```
# splitting training and testing data
from sklearn.linear_model import LinearRegression
from sklearn.model_selection import train_test_split
import matplotlib.pyplot as plt
```

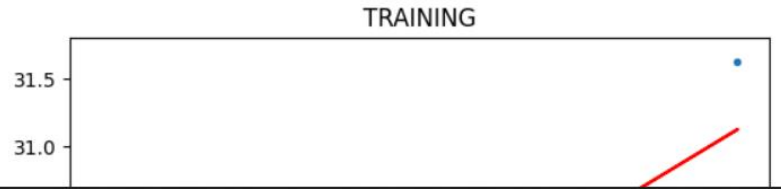
In [22]:
```
x = d[["DEC"]]
y = d[["ANNUAL"]]
x_train, x_test, y_train, y_test = train_test_split(x, y, test_size = 0.3)
LinReg = LinearRegression()
LinReg.fit(x_train, y_train)
```

Out[22]:
```
LinearRegression
LinearRegression()
```

In [23]:
```
m = LinReg.coef_
c = LinReg.intercept_
print("m : ", m, "c : ", c)
```

```
m :  [[0.57343377]] c :  [15.06349014]
```

In [24]:
```
# Training data
plt.title("TRAINING")
plt.scatter(x_train, y_train, marker = '.')
Y_train = LinReg.predict(x_train)
plt.plot(x_train, Y_train, color = 'red')
plt.xlabel("JAN")
plt.ylabel("ANNUAL")
plt.show()
```



Desktop/ML/ML_LAB/ | Untitled - Jupyter Notebook | New Tab

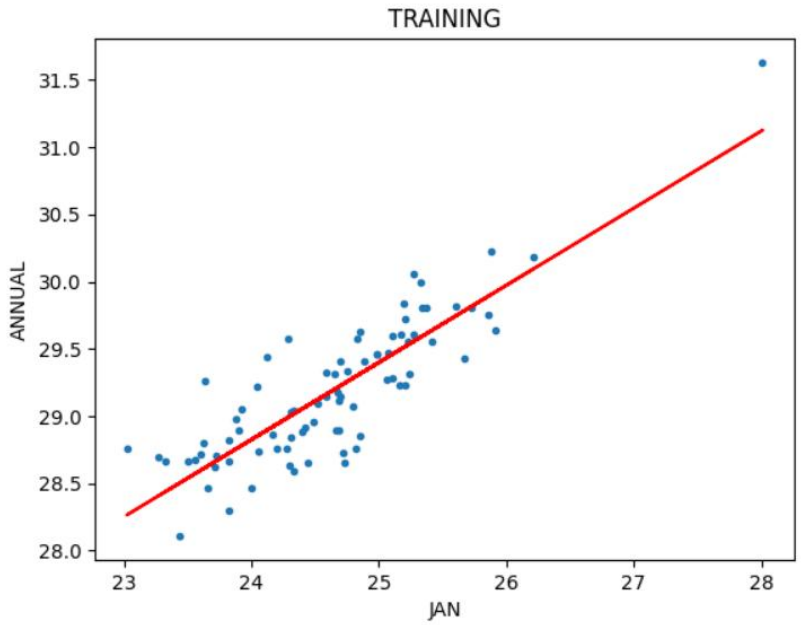
localhost:8888/notebooks/Desktop/ML/ML_LAB/Untitled.ipynb?kernel_name=python3

jupyter Untitled Last Checkpoint: 21 minutes ago (unsaved changes) Logout

File Edit View Insert Cell Kernel Help Trusted Python 3 (ipykernel)

Run Code

In [24]:
```
# Training data
plt.title("TRAINING")
plt.scatter(x_train, y_train, marker = '.')
Y_train = LinReg.predict(x_train)
plt.plot(x_train, Y_train, color = 'red')
plt.xlabel("JAN")
plt.ylabel("ANNUAL")
plt.show()
```



In [25]:
```
# Testing data
plt.title("TESTING")
plt.scatter(x_test, y_test, marker = '.')
```

Desktop/ML/ML_LAB/ | Untitled - Jupyter Notebook | New Tab

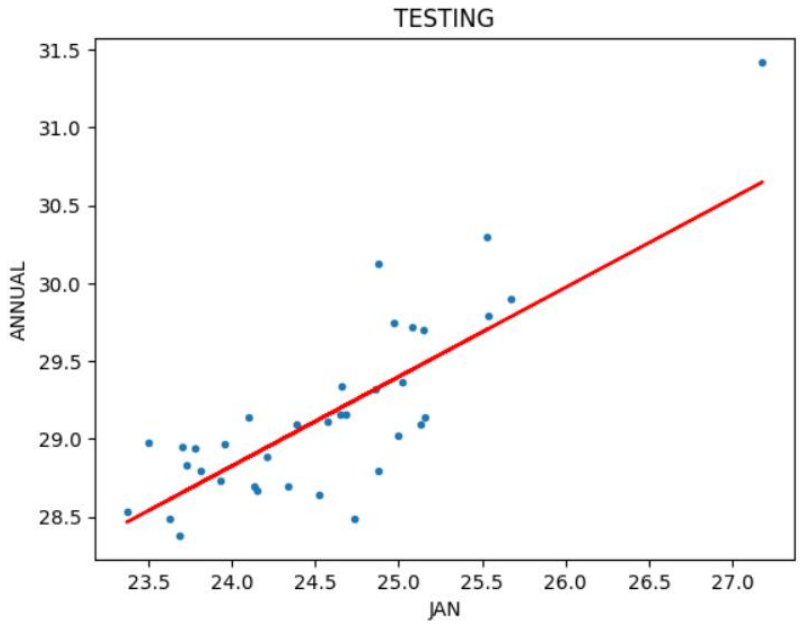
localhost:8888/notebooks/Desktop/ML/ML_LAB/Untitled.ipynb?kernel_name=python3

jupyter Untitled Last Checkpoint: 21 minutes ago (unsaved changes) Logout

File Edit View Insert Cell Kernel Help Trusted Python 3 (ipykernel)

Run Code

In [25]:
```
# Testing data
plt.title("TESTING")
plt.scatter(x_test, y_test, marker = '.')
Y_test = LinReg.predict(x_test)
plt.plot(x_test, Y_test, color = 'red')
plt.xlabel("JAN")
plt.ylabel("ANNUAL")
plt.show()
```



In [26]:
```
from sklearn.metrics import r2_score, mean_absolute_error, mean_squared_error
```

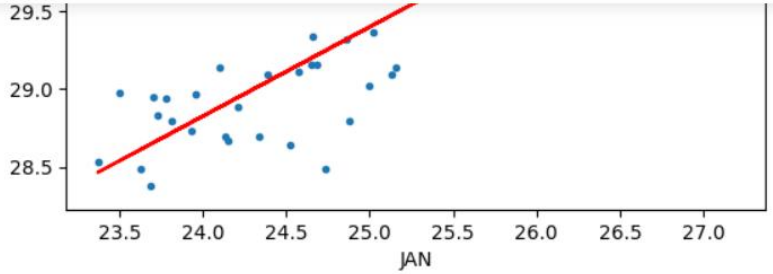
Desktop/ML/ML_LAB/ | Untitled - Jupyter Notebook | New Tab

localhost:8888/notebooks/Desktop/ML/ML_LAB/Untitled.ipynb?kernel_name=python3

jupyter Untitled Last Checkpoint: 21 minutes ago (unsaved changes) Logout

File Edit View Insert Cell Kernel Help Trusted Python 3 (ipykernel)

Run Code



In [26]:
```
from sklearn.metrics import r2_score, mean_absolute_error, mean_squared_error
```

In [28]:
```
# For testing data
# R-Square
r2_score(y_test, Y_test)
```

Out[28]: 0.6800891103290092

In [29]:
```
mean_squared_error(y_test, Y_test)
```

Out[29]: 0.11552683265314746

In [30]:
```
mean_absolute_error(y_test, Y_test)
```

Out[30]: 0.26209962378402335

In [ ]: