In [17]:
```
import pandas as pd
import numpy as np
```

In [18]:
```
df=pd.read_csv("temperatures.csv")
df
```

Out[18]:

	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANI
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	
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	
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	
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	
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	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
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	
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	
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	
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	
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	

117 rows × 18 columns

In [21]:
```
columns=["YEAR","JAN","FEB","MAR","APR","MAY","JUN","JUL","AUG","SEP","OCT","NOV"
df=pd.read_csv("temperatures.csv",usecols=columns)
df
```

Out[21]:

	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	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
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
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
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
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
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
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
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
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
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
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

117 rows × 13 columns

In [22]:
```
from sklearn.model_selection import train_test_split
```

In [23]:
```
x=df[["YEAR"]]
y=df[["JAN","FEB","MAR","APR","MAY","JUN","JUL","AUG","SEP","OCT","NOV","DEC"]]
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.25)
```

In [42]:
```
from sklearn import linear_model
from sklearn.linear_model import LinearRegression
reg=LinearRegression()
```

In [43]:
```
reg.fit(x_train,y_train)
```

Out[43]:
```
LinearRegression()
```

In [46]:
```
y_pred=reg.predict(x_test)
y_pred
```

Out[46]:
```
array([[24.38543092, 26.44449634, 30.0894939 , 32.82505109, 34.14211706,
        33.01584431, 31.39383194, 30.92296   , 31.05547559, 30.45789462,
        28.03613558, 25.40917833],
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        28.37284416, 25.77477641],
       [24.61164622, 26.74919621, 30.33360738, 33.05926478, 34.31143442,
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        28.26762273, 25.66052701],
       [24.77616644, 26.97079612, 30.51114446, 33.22960202, 34.43457432,
        33.17373111, 31.5848525 , 31.13381688, 31.31889385, 30.81580374,
        28.43597702, 25.84332605],
       [23.56282984, 25.33649681, 29.2018085 , 31.97336494, 33.52641757,
        32.68345104, 30.9916834 , 30.4790508 , 30.50091083, 29.70440174,
        27.19436414, 24.49518311],
       [24.32373584, 26.36139638, 30.02291749, 32.76117463, 34.0959396 ,
        32.99091481, 31.3636708 , 30.88966681, 31.01388323, 30.40138266,
        27.97300272, 25.34062869],
       [23.43943968, 25.17029688, 29.06865569, 31.84561202, 33.43406265,
        32.63359205, 30.93136112, 30.41246442, 30.41772611, 29.5913778 ,
        27.06809842, 24.35808383],
       [24.79673146, 26.99849611, 30.5333366 , 33.25089417, 34.44996681,
        33.18204094, 31.59490622, 31.14491461, 31.33275797, 30.83464107,
        28.4570213 , 25.86617593],
       [23.00757411, 24.58859712, 28.60262086, 31.39847678, 33.11082041,
        32.45908558, 30.72023313, 30.17941209, 30.12657961, 29.19579404,
        26.62616841, 23.87823635],
       [23.27491946, 24.94869697, 28.89111861, 31.67527478, 33.31092275,
        32.56711339, 30.85093141, 30.32368258, 30.30681316, 29.44067922,
        26.89974413, 24.17528479],
       [22.65796865, 24.11769732, 28.22535456, 31.03651017, 32.84914813,
        32.31781844, 30.54932   , 29.99075067, 29.89088959, 28.87555956,
        26.26841555, 23.48978838],
       [23.64508995, 25.44729676, 29.29057704, 32.05853355, 33.58798752,
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        27.27854128, 24.58658264],
       [22.88418394, 24.42239719, 28.46946805, 31.27072386, 33.01846549,
        32.40922659, 30.65991085, 30.1128257 , 30.0433949 , 29.0827701 ,
```

```
       26.4999027 , 23.74113706],
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       28.07822415, 25.45487809],
      [23.25435443, 24.92099698, 28.86892648, 31.65398263, 33.29553026,
       32.55880356, 30.84087769, 30.31258485, 30.29294904, 29.4218419 ,
       26.87869985, 24.15243491],
      [23.99469541, 25.91819656, 29.66784333, 32.42050017, 33.8496598 ,
       32.8579575 , 31.20281139, 30.71210313, 30.79205733, 30.0999855 ,
       27.63629415, 24.9750306 ],
      [23.37774459, 25.08719691, 29.00207929, 31.78173555, 33.38788519,
       32.60866255, 30.90119997, 30.37917123, 30.37613375, 29.53486584,
       27.00496556, 24.28953419],
      [23.78904514, 25.64119668, 29.44592198, 32.20757863, 33.69573493,
       32.77485919, 31.10227425, 30.60112583, 30.65341614, 29.91161228,
       27.42585129, 24.7465318 ],
      [24.73503638, 26.91539614, 30.46676019, 33.18701771, 34.40378935,
       33.15711144, 31.56474508, 31.11162142, 31.29116561, 30.7781291 ,
       28.39388844, 25.79762629],
      [22.925314  , 24.47779717, 28.51385232, 31.31330817, 33.04925047,
       32.42584625, 30.68001827, 30.13502116, 30.07112313, 29.12044475,
       26.54199127, 23.78683682],
      [23.89187027, 25.77969662, 29.55688266, 32.3140394 , 33.77269737,
       32.81640834, 31.15254282, 30.65661448, 30.72273673, 30.00579889,
       27.53107272, 24.8607812 ],
      [23.60395989, 25.39189678, 29.24619277, 32.01594925, 33.55720255,
       32.7000707 , 31.01179083, 30.50124626, 30.52863906, 29.74207638,
       27.23645271, 24.54088288],
      [24.65277627, 26.80459619, 30.37799165, 33.10184909, 34.3422194 ,
       33.12387212, 31.52453022, 31.0672305 , 31.23570914, 30.70277981,
       28.3097113 , 25.70622677],
      [24.75560141, 26.94309613, 30.48895233, 33.20830986, 34.41918183,
       33.16542128, 31.57479879, 31.12271915, 31.30502973, 30.79696642,
       28.41493273, 25.82047617],
      [23.17209432, 24.81019703, 28.78015794, 31.56881402, 33.23396031,
       32.52556423, 30.80066284, 30.26819393, 30.23749256, 29.34649261,
       26.7945227 , 24.06103539]])
```

In [47]:
```
reg.predict([[2018]])
```

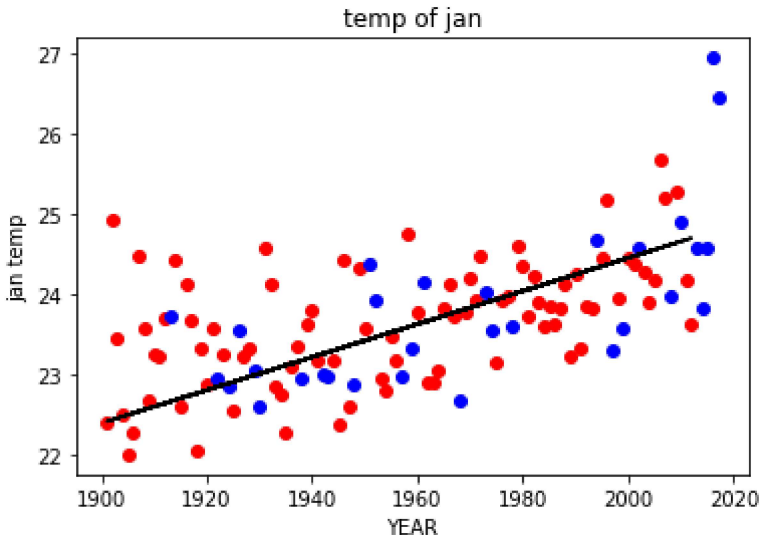
```
C:\Users\adity\anaconda3\lib\site-packages\sklearn\base.py:450: UserWarning: X
does not have valid feature names, but LinearRegression was fitted with feature
names
  warnings.warn(
```

Out[47]:
```
array([[24.81729649, 27.0261961 , 30.55552873, 33.27218632, 34.46535929,
        33.19035077, 31.60495993, 31.15601234, 31.34662209, 30.85347839,
        28.47806559, 25.88902581]])
```

In [50]:
```
mae=np.mean(abs(y_test-y_pred))
mae
```

Out[50]:
```
JAN    0.554172
FEB    0.827596
MAR    0.746091
APR    0.809946
MAY    0.582918
JUN    0.454042
JUL    0.296252
AUG    0.278695
SEP    0.327115
OCT    0.449737
NOV    0.469496
DEC    0.564847
dtype: float64
```

In [52]:
```
import matplotlib.pyplot as plt
plt.scatter(x_train,y_train["JAN"],color="red");
plt.scatter(x_test,y_test["JAN"],color="blue");
plt.title("temp of jan")
plt.xlabel("YEAR")
plt.ylabel("jan temp")
plt.plot(x_train["YEAR"],reg.predict(x_train)[:,0],color="black")
plt.show()
```



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