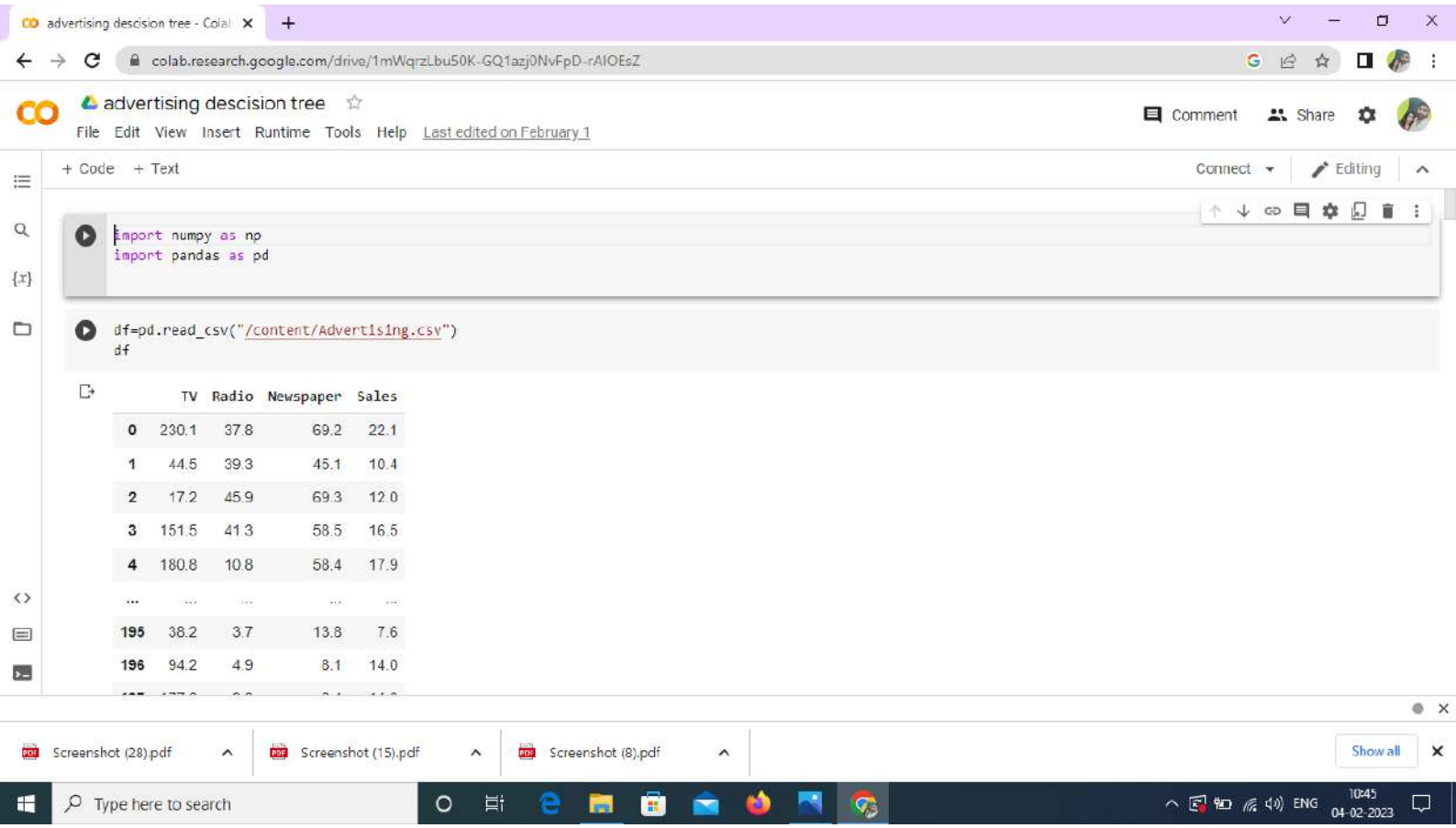
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import numpy as np
import pandas as pd
df=pd.read_csv("/content/Advertising.csv")
df
TV Radio Newspaper Sales
0 230.1 37.8 69.2 22.1
1 44.5 39.3 45.1 10.4
2 17.2 45.9 69.3 12.0
3 151.5 41.3 58.5 16.5
4 180.8 10.8 58.4 17.9
195 38.2 3.7 13.8 7.6
196 94.2 4.9 8.1 14.0

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```
[ ] df.columns
```

```
Index(['TV', 'Radio', 'Newspaper', 'Sales'], dtype='object')
```

```
df.head()
```

	TV	Radio	Newspaper	Sales
0	230.1	37.8	69.2	22.1
1	44.5	39.3	45.1	10.4
2	17.2	45.9	69.3	12.0
3	151.5	41.3	58.5	16.5
4	180.8	10.8	58.4	17.9

```
[ ] df.tail()
```

	TV	Radio	Newspaper	Sales
195	38.2	3.7	13.8	7.6

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```
[ ] df.isna().sum()
```

```
TV           0
Radio        0
Newspaper    0
Sales        0
dtype: int64
```

```
x=df.iloc[:,:-1]
x
```

	TV	Radio	Newspaper
0	230.1	37.8	69.2
1	44.5	39.3	45.1
2	17.2	45.9	69.3
3	151.5	41.3	58.5
4	180.8	10.8	58.4
...	...	...	...

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```
y=df.iloc[:,-1]
y
```

```
0      22.1
1      10.4
2      12.0
3      16.5
4      17.9
       ...
195     7.6
196    14.0
197    14.8
198    25.5
199    18.4
Name: Sales, Length: 200, dtype: float64
```

```
[ ] from sklearn.model_selection import train_test_split
    x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.30,random_state=42)
    x_train
```

	TV	Radio	Newspaper
169	284.3	10.6	6.4
97	184.9	21.0	22.0

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```
[ ] x_train
```

	TV	Radio	Newspaper
169	284.3	10.6	6.4
97	184.9	21.0	22.0
31	112.9	17.4	38.6
12	23.8	35.1	65.9
35	290.7	4.1	8.5
...	...	...	...
106	25.0	11.0	29.7
14	204.1	32.9	46.0
92	217.7	33.5	59.0
179	165.6	10.0	17.6
102	280.2	10.1	21.4

140 rows × 3 columns

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```
y_train
```

```
169    20.0
97     20.5
31     11.9
12      9.2
35     17.8
       ...
106     7.2
14     19.0
92     19.4
179    17.6
102    19.8
Name: Sales, Length: 140, dtype: float64
```

```
[ ] y_test
```

```
95     16.9
15     22.4
30     21.4
158     7.3
128    24.7
115    12.6
69     22.3
170     8.4
```

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```
[ ] from sklearn.tree import DecisionTreeRegressor
    model=DecisionTreeRegressor()
    model.fit(x_train,y_train)
    y_pred=model.predict(x_test)
    y_pred
```

```
array([18. , 23.8, 19.6,  5.6, 23.8, 15.3, 22.6,  9.6, 17.8, 17.1,  8.8,
        9.7, 16.7,  3.2, 13.2, 17.9,  5.6, 17. , 11.9, 20.9, 19.6, 15.3,
       10.8, 21.5,  9.7,  9.7, 22.6, 13.2, 11.5,  4.8, 15.5, 13.2, 23.8,
       12. , 20.1, 20.9, 10.4, 19.6, 13.2,  6.7, 13.2, 17.6, 10.1,  9.6,
       16.8,  9.6, 12.3, 10.1, 13.2, 13.3, 13.6, 17.6,  5.6,  5.6, 11.9,
       13.2, 13.2, 27. ,  6.6, 15.5])
```

```
df1=pd.DataFrame({'Actual_value':y_test,'Predicted_value':y_pred})
df1
```

	Actual_value	Predicted_value
95	16.9	18.0
15	22.4	23.8
30	21.4	19.6
158	7.3	5.6

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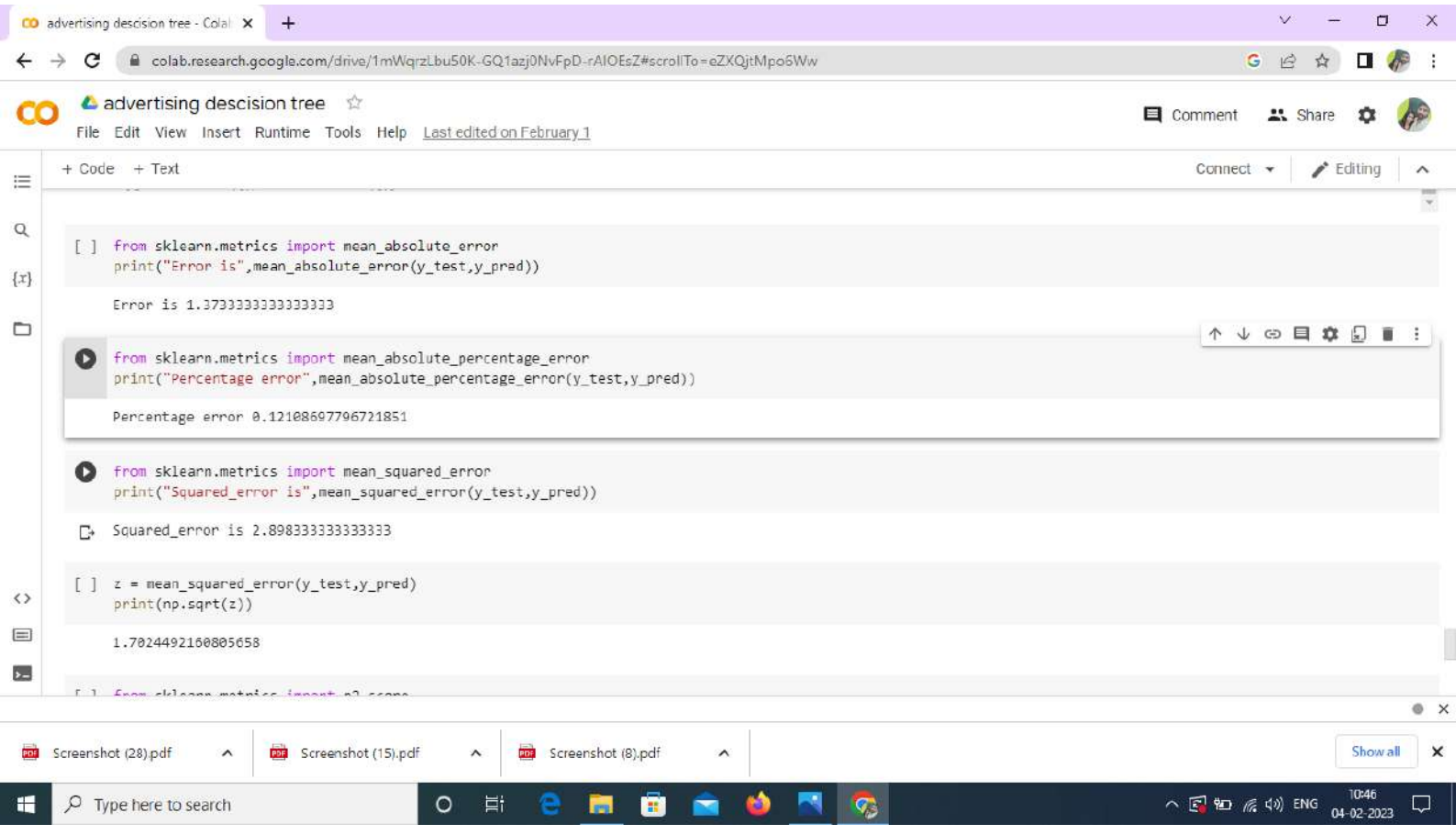
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[ ] from sklearn.metrics import mean_absolute_error
print("Error is",mean_absolute_error(y_test,y_pred))
Error is 1.3733333333333333
from sklearn.metrics import mean_absolute_percentage_error
print("Percentage error",mean_absolute_percentage_error(y_test,y_pred))
Percentage error 0.12108697796721851
from sklearn.metrics import mean_squared_error
print("Squared_error is",mean_squared_error(y_test,y_pred))
Squared_error is 2.898333333333333
[ ] z = mean_squared_error(y_test,y_pred)
print(np.sqrt(z))
1.7024492160805658

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```
[ ] from sklearn.metrics import mean_squared_error
    print("Squared_error is",mean_squared_error(y_test,y_pred))
```

```
Squared_error is 2.898333333333333
```

```
[ ] z = mean_squared_error(y_test,y_pred)
    print(np.sqrt(z))
```

```
1.7024492160805658
```

```
[ ] from sklearn.metrics import r2_score
    print("R2 score is",r2_score(y_test,y_pred))
```

```
R2 score is 0.896397689888915
```

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