In [1]:
```
import pandas as pd
dataset=pd.read_csv("C:/Users/Harshini/Downloads/50_Startups.csv")
df=pd.DataFrame(dataset)
df
```

Out[1]:

	R&D Spend	Administration	Marketing Spend	State	Profit
0	165349.20	136897.80	471784.10	New York	192261.83
1	162597.70	151377.59	443898.53	California	191792.06
2	153441.51	101145.55	407934.54	Florida	191050.39
3	144372.41	118671.85	383199.62	New York	182901.99
4	142107.34	91391.77	366168.42	Florida	166187.94
...	...	...	...	...	...
103	119943.24	156547.42	256512.92	Florida	132602.65
104	114523.61	122616.84	261776.23	New York	129917.04
105	78013.11	121597.55	264346.06	California	126992.93
106	94657.16	145077.58	282574.31	New York	125370.37
107	91749.16	114175.79	294919.57	Florida	124266.90

108 rows × 5 columns

In [11]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 108 entries, 0 to 107
Data columns (total 5 columns):
 #   Column           Non-Null Count  Dtype  
---  ------           --------------  -----  
 0   R&D Spend        108 non-null    float64
 1   Administration   108 non-null    float64
 2   Marketing Spend  108 non-null    float64
 3   State            108 non-null    object 
 4   Profit           108 non-null    float64
dtypes: float64(4), object(1)
memory usage: 4.3+ KB
```

In [12]:
```
df.describe()
```

Out[12]:

	R&D Spend	Administration	Marketing Spend	Profit
count	108.000000	108.000000	108.000000	108.000000
mean	75653.105556	121750.788889	224031.590648	113523.760000
std	44348.861595	27322.385654	113887.603123	38991.013654
min	542.050000	51283.140000	1903.930000	14681.400000
25%	42692.090000	105077.645000	137962.620000	90708.190000
50%	75791.365000	122699.795000	249744.550000	109543.120000
75%	101913.080000	145077.580000	298932.675000	141585.520000
max	165349.200000	182645.560000	475411.300000	192261.830000

In [13]:
```
df.shape
```

Out[13]:
```
(108, 5)
```

In [14]:
```
df.columns
```

Out[14]:
```
Index(['R&D Spend', 'Administration', 'Marketing Spend', 'State', 'Profit'], dtype='object')
```

In [15]:
```
df.dtypes
```

Out[15]:
```
R&D Spend          float64
Administration     float64
Marketing Spend    float64
State               object
Profit             float64
dtype: object
```

In [16]:
```
df.isnull().sum()
```

Out[16]:
```
R&D Spend          0
Administration     0
Marketing Spend    0
State              0
Profit             0
dtype: int64
```

In [17]:
```
df.duplicated()
```

Out[17]:
```
0      False
1      False
2      False
3      False
4      False
       ...
103     True
104     True
105     True
106     True
107     True
Length: 108, dtype: bool
```

In [26]:
```
df.drop_duplicates(keep=False,inplace=True)
```

In [27]:
```
df.duplicated().sum()
```

Out[27]:
```
0
```

In [28]:
```
df.head()
```

Out[28]:

	R&D Spend	Administration	Marketing Spend	State	Profit
19	86419.70	153514.11	123452.10	New York	122776.86
30	61994.48	115641.28	91131.24	Florida	99937.59
31	61136.38	152701.92	88218.23	New York	97483.56
34	46426.07	157693.92	210797.67	California	96712.80
35	46014.02	85047.44	205517.64	New York	96479.51

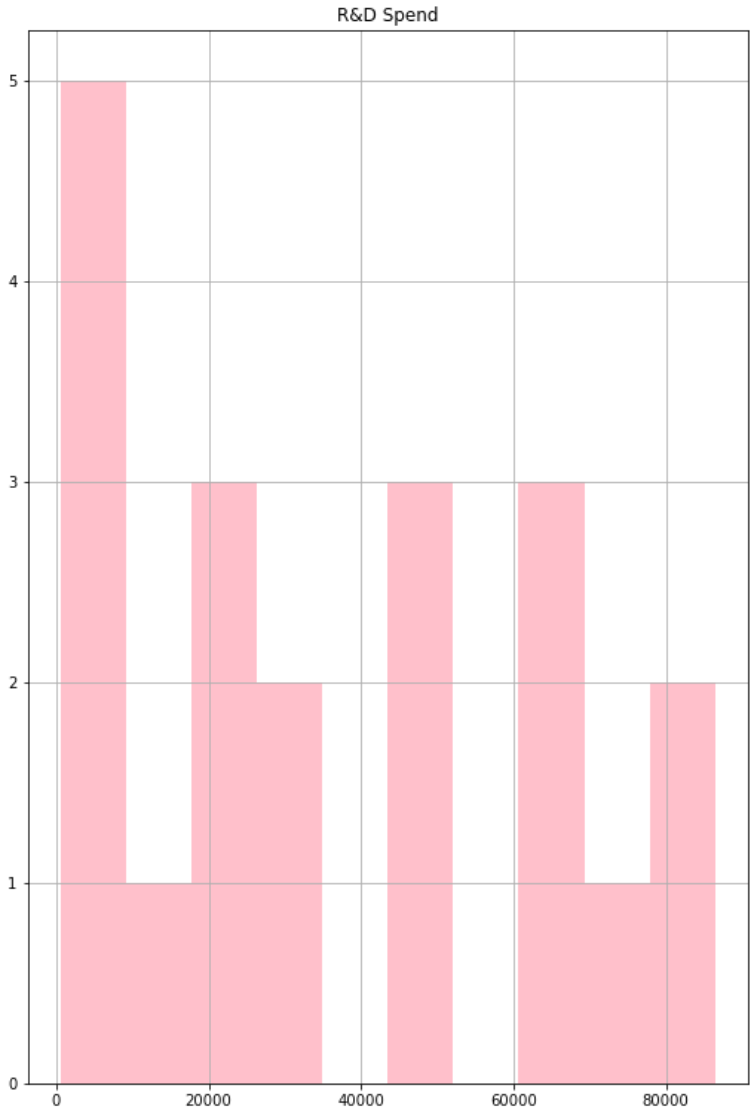
In [29]:
```
df.tail()
```

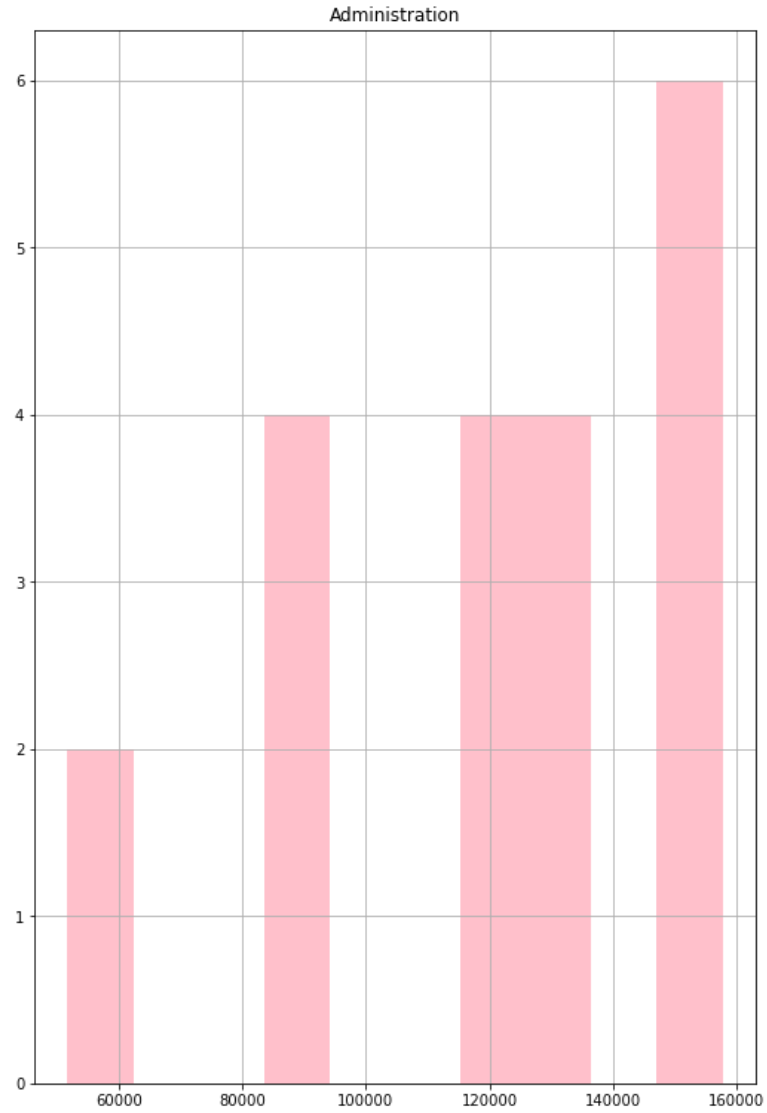
Out[29]:

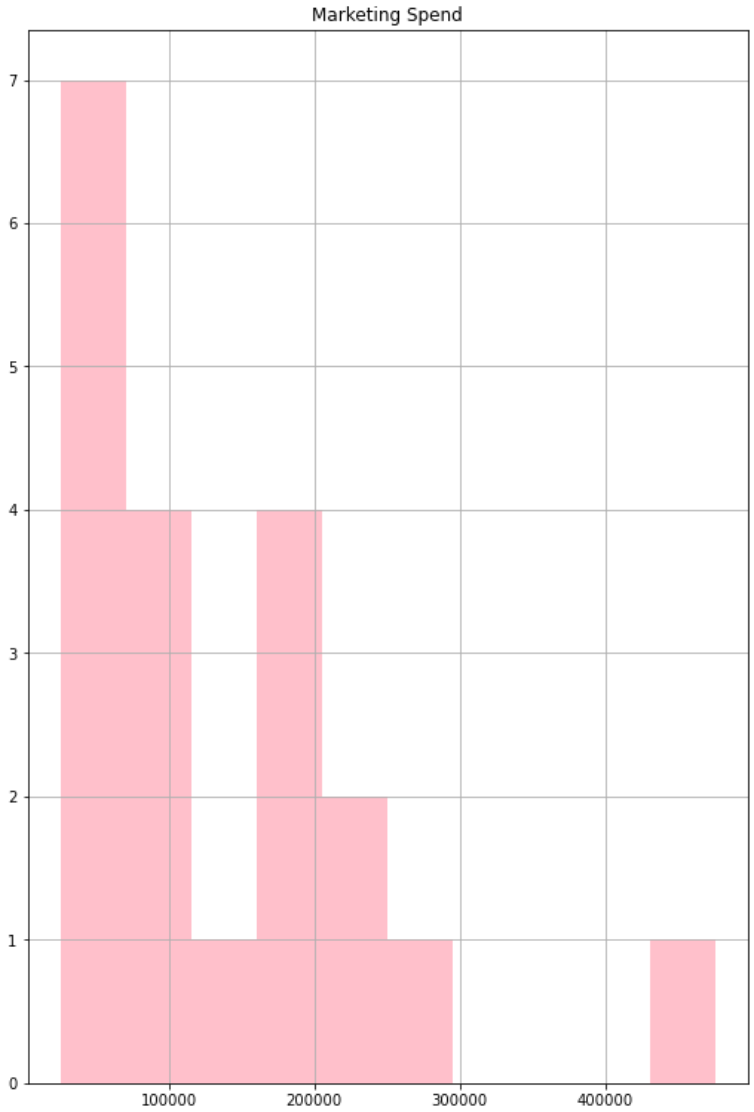
	R&D Spend	Administration	Marketing Spend	State	Profit
80	27892.92	84710.77	164470.71	New York	77798.83
82	20229.59	127382.30	35534.17	New York	69758.98
86	1234.10	135426.92	31234.40	California	42559.73
87	542.05	51743.15	25671.30	New York	35673.41
88	734.50	116983.80	45173.06	California	14681.40

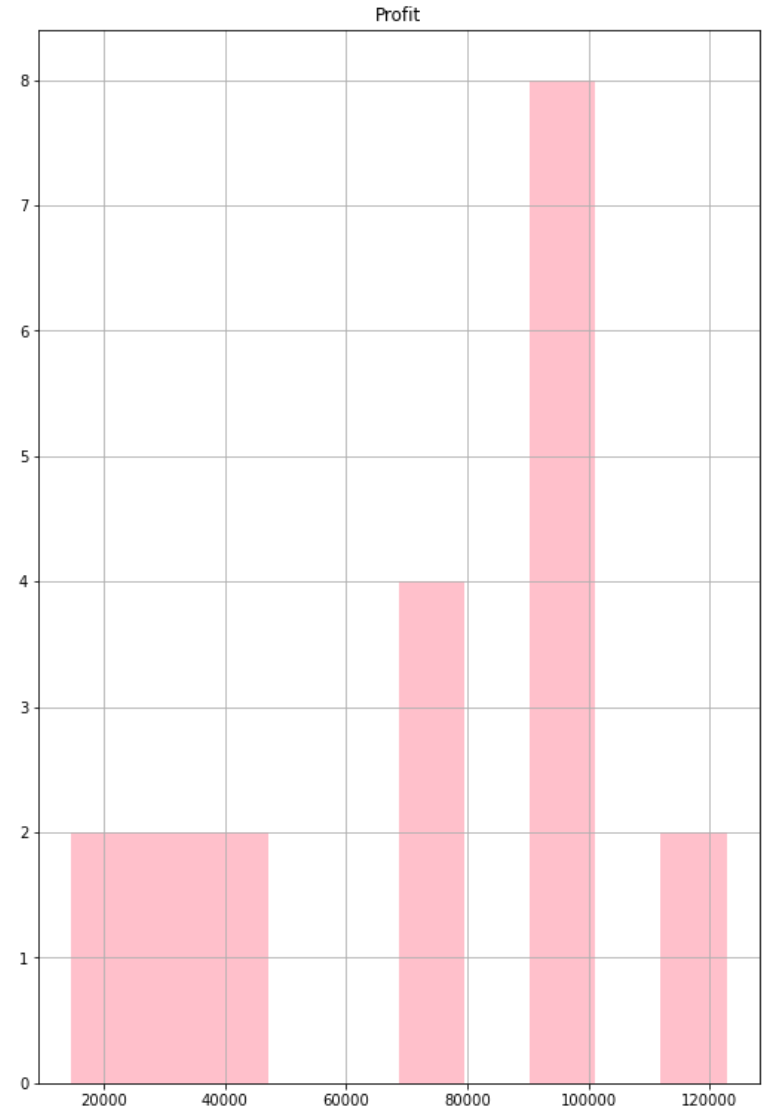
In [3]:
```
import matplotlib.pyplot as plt
import seaborn as sns
```

In [31]:
```
df.hist(figsize=(20,30),color='pink')
plt.show()
```

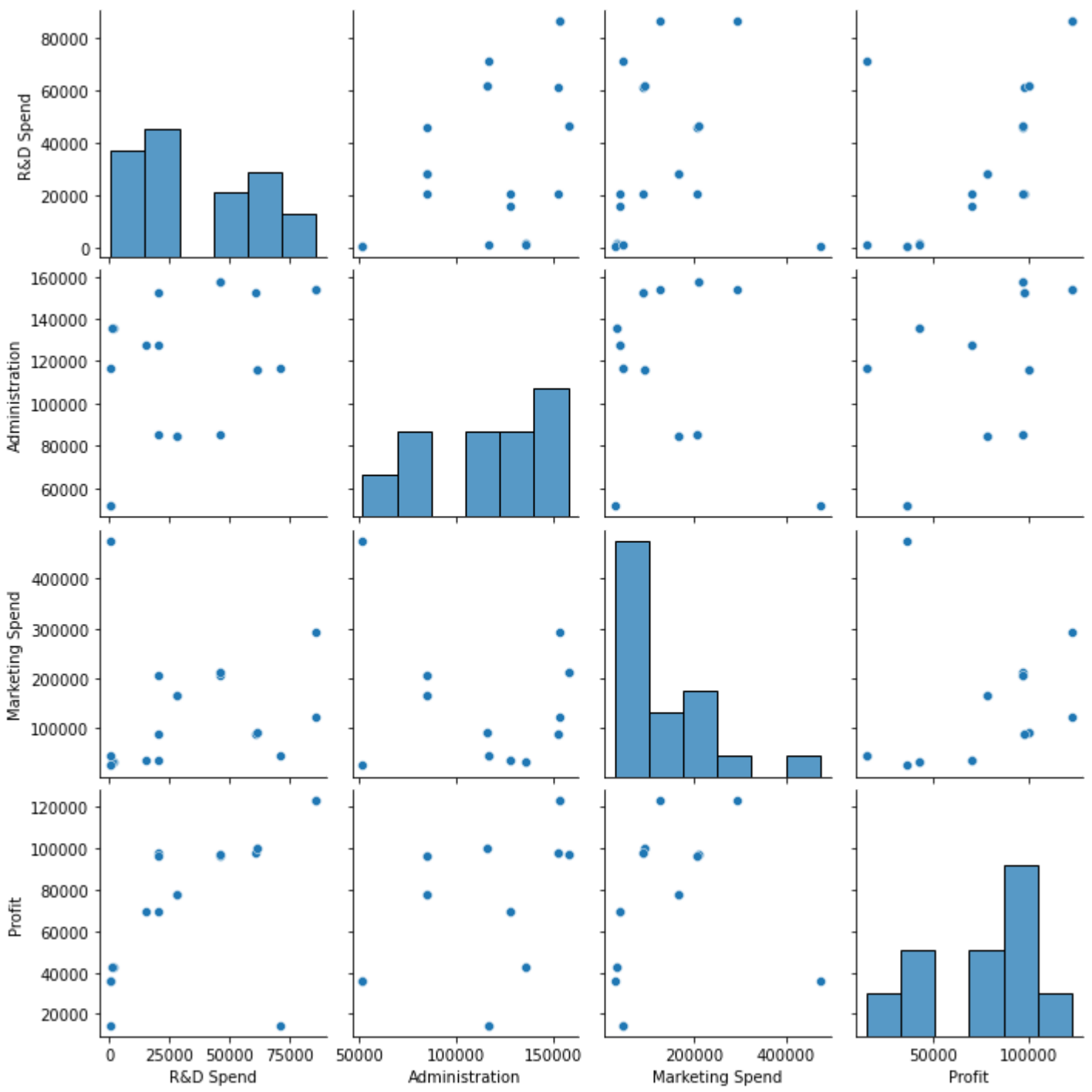





Marketing Spend
0
1
2
3
4
5
6
7
100000
200000
300000
400000


Profit
0
1
2
3
4
5
6
7
8
20000
40000
60000
80000
100000
120000

In [32]:
```
sns.pairplot(df)
plt.show()
```


R&D Spend
Administration
Marketing Spend
Profit
0
20000
40000
60000
80000
100000
120000
140000
160000
200000
300000
400000
25000
50000
75000
150000

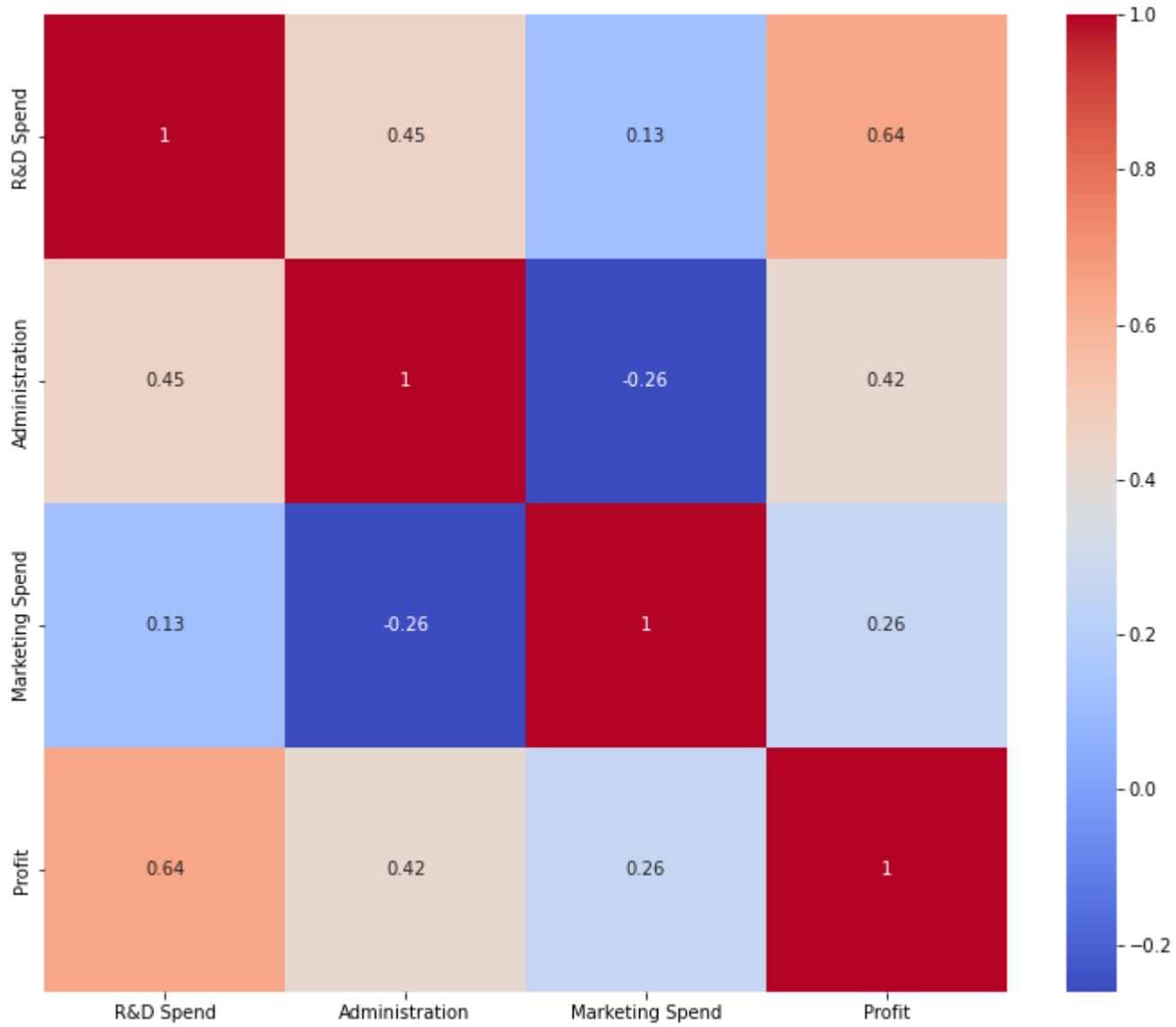
In [34]:
```
corr=df.corr()
corr
```

Out[34]:

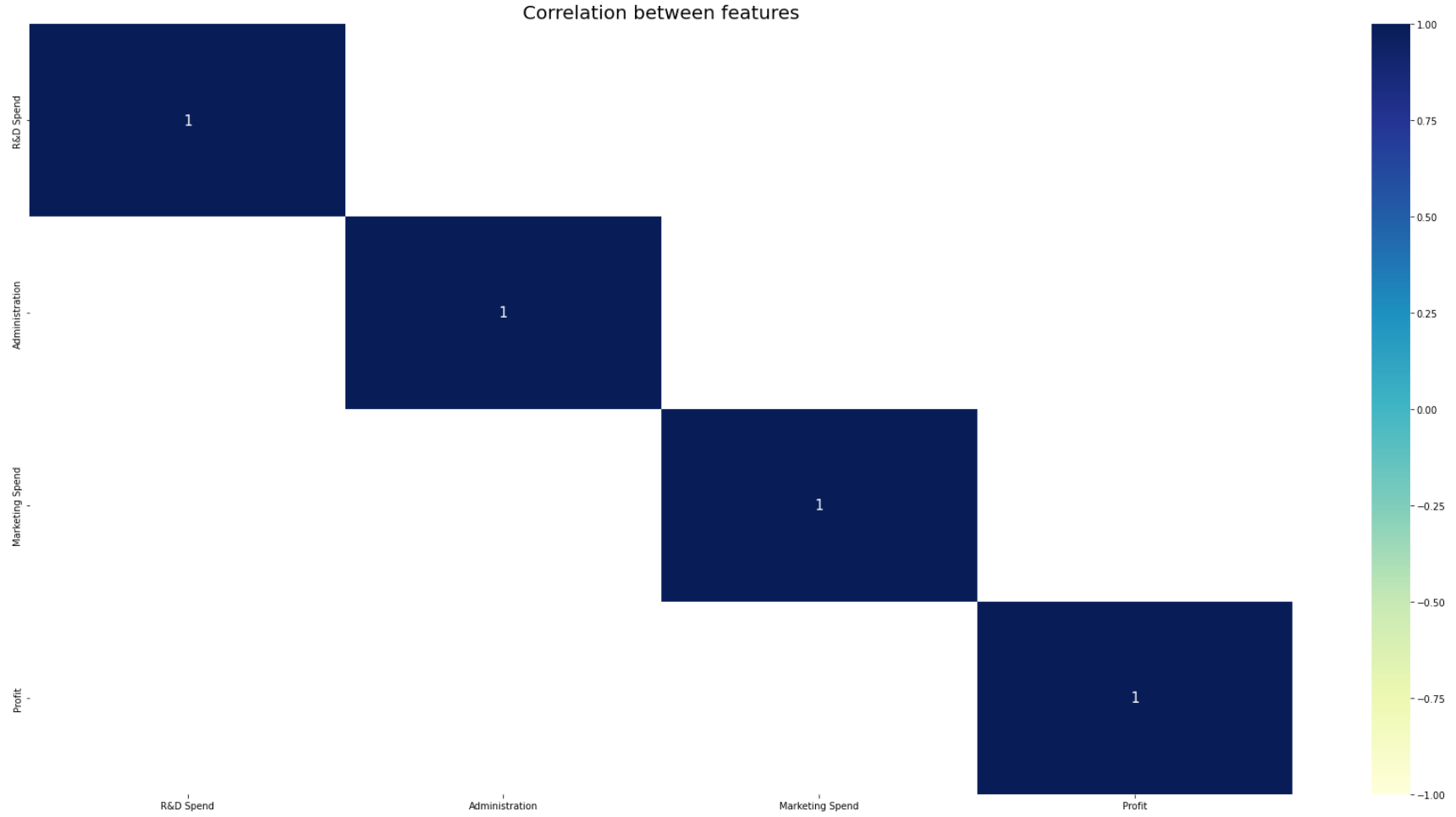
	R&D Spend	Administration	Marketing Spend	Profit
R&D Spend	1.000000	0.451334	0.127247	0.640613
Administration	0.451334	1.000000	-0.260522	0.418904
Marketing Spend	0.127247	-0.260522	1.000000	0.261639
Profit	0.640613	0.418904	0.261639	1.000000

In [35]:
```
plt.figure(figsize=(12,10))
sns.heatmap(corr,annot=True,cmap='coolwarm')
```

Out[35]: <AxesSubplot:>

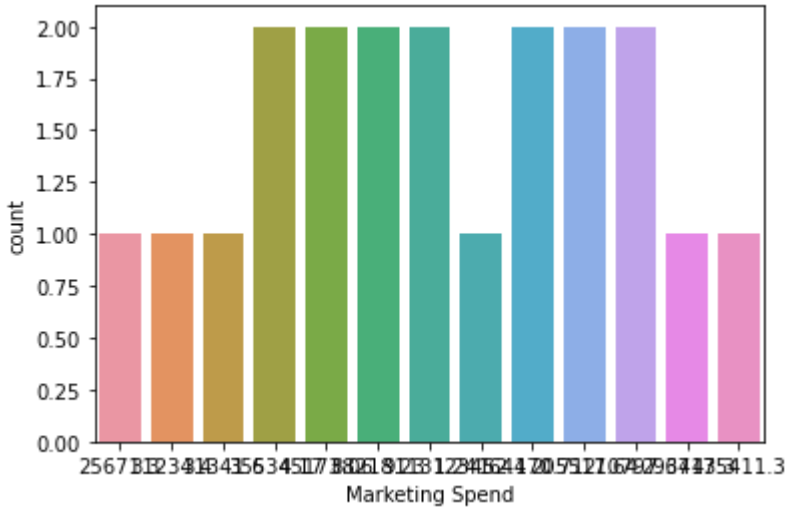


In [36]:
```
plt.figure(figsize=(30, 15))

sns.heatmap(corr[(corr >= 0.8) | (corr <= -0.9)],
            cmap='YlGnBu', vmax=1.0, vmin=-1.0,
            annot=True, annot_kws={"size": 15})
plt.title('Correlation between features', fontsize=20)
plt.show()
```



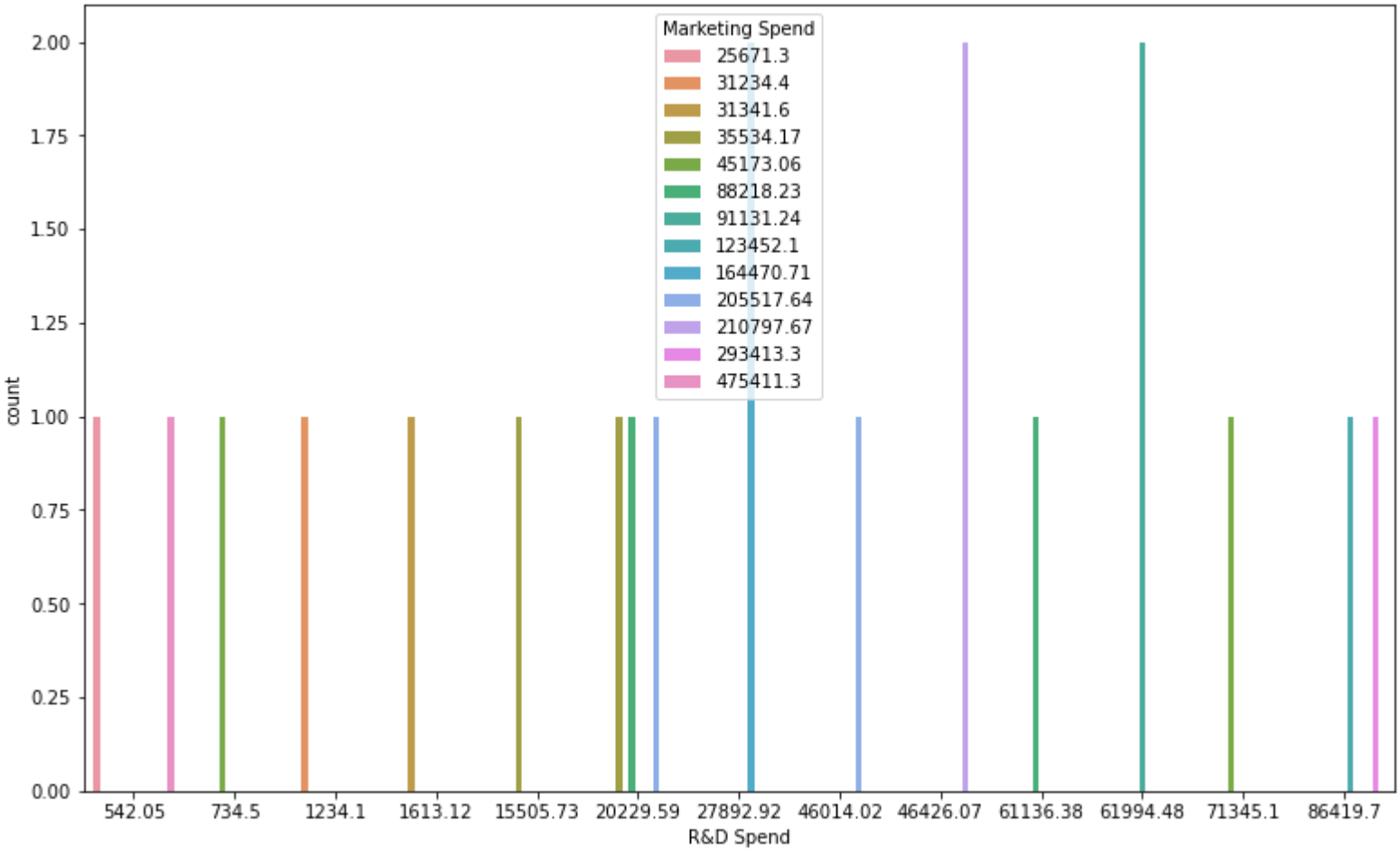
In [41]:
```
sns.countplot(x="Marketing Spend",data=df)
```

Out[41]:
```
<AxesSubplot:xlabel='Marketing Spend', ylabel='count'>
```



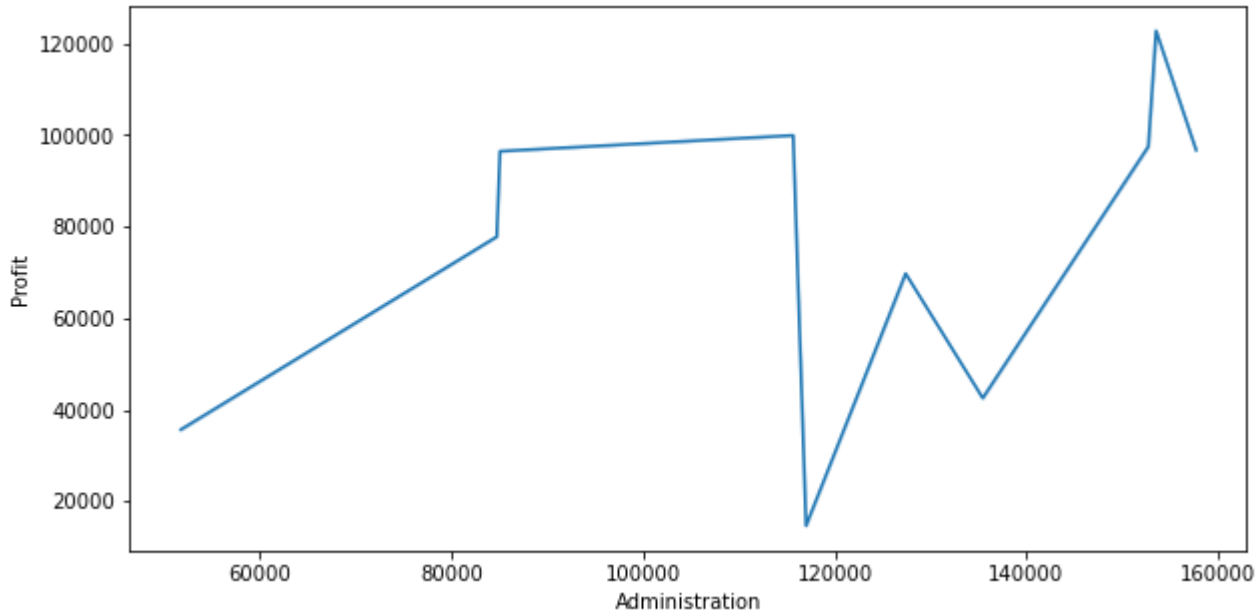
In [48]:
```
plt.figure(figsize=(13,8))

sns.countplot(data=df, x='R&D Spend', hue='Marketing Spend')
```

Out[48]: <AxesSubplot:xlabel='R&D Spend', ylabel='count'>



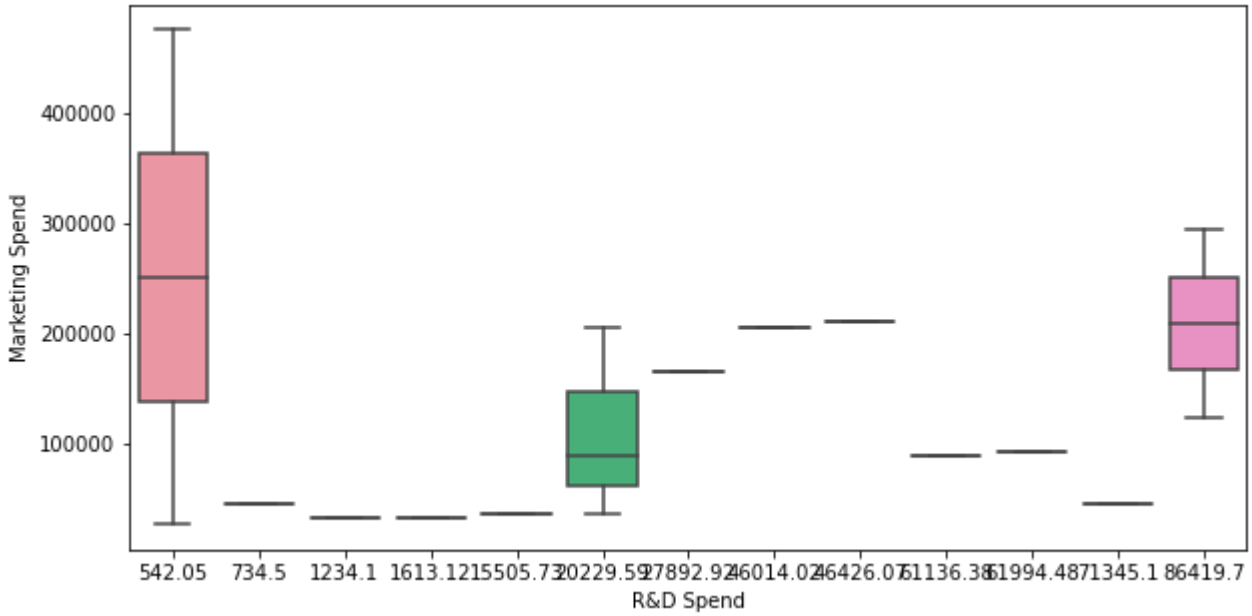
In [42]:
```
plt.figure(figsize=(10,5))
sns.lineplot(data=df, x='Administration', y='Profit')
```

Out[42]: <AxesSubplot:xlabel='Administration', ylabel='Profit'>



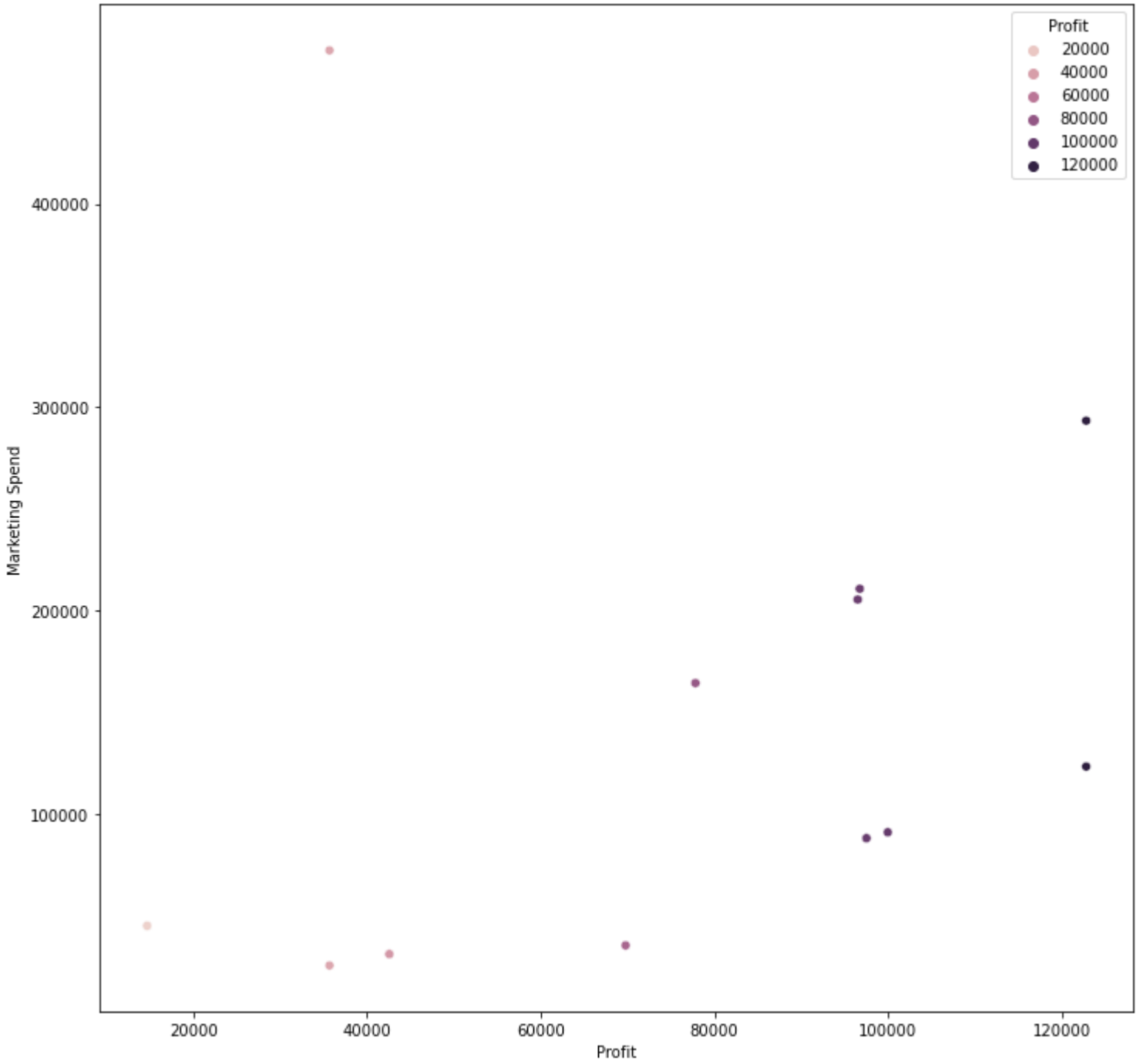
In [46]:
```
plt.figure(figsize=(10,5))
sns.boxplot(data=df, x="R&D Spend", y="Marketing Spend")
```

Out[46]: <AxesSubplot:xlabel='R&D Spend', ylabel='Marketing Spend'>

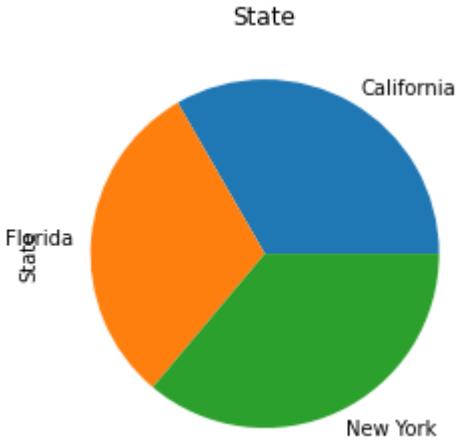


In [47]:
```
plt.figure(figsize=(12,12))
sns.scatterplot(data=df, x='Profit', y='Marketing Spend', hue='Profit')
```

Out[47]:
```
<AxesSubplot:xlabel='Profit', ylabel='Marketing Spend'>
```


Profit
20000
40000
60000
80000
100000
120000
400000
300000
200000
100000
Marketing Spend
20000
40000
60000
80000
100000
120000
Profit

In [4]:
```
df.groupby('State').State.count().plot(kind='pie')
plt.title('State')
plt.show()
```



In [ ]:
```

```