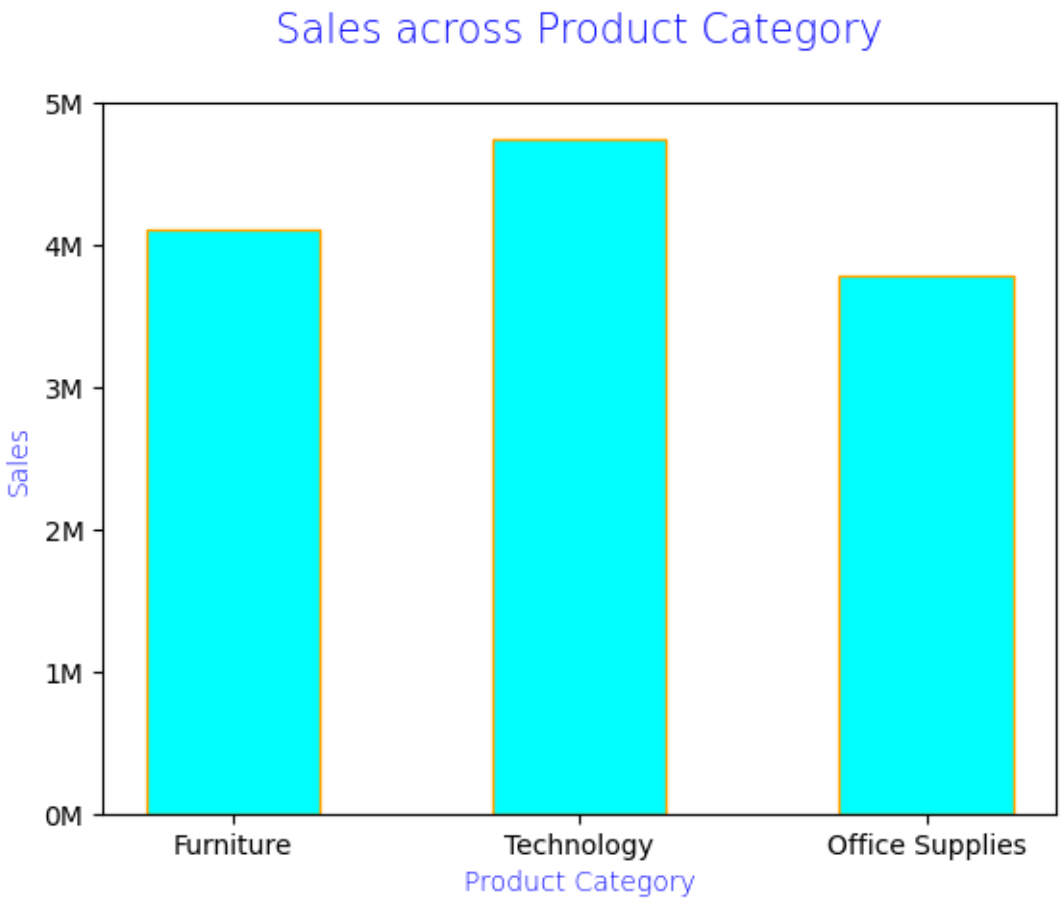
Class 06

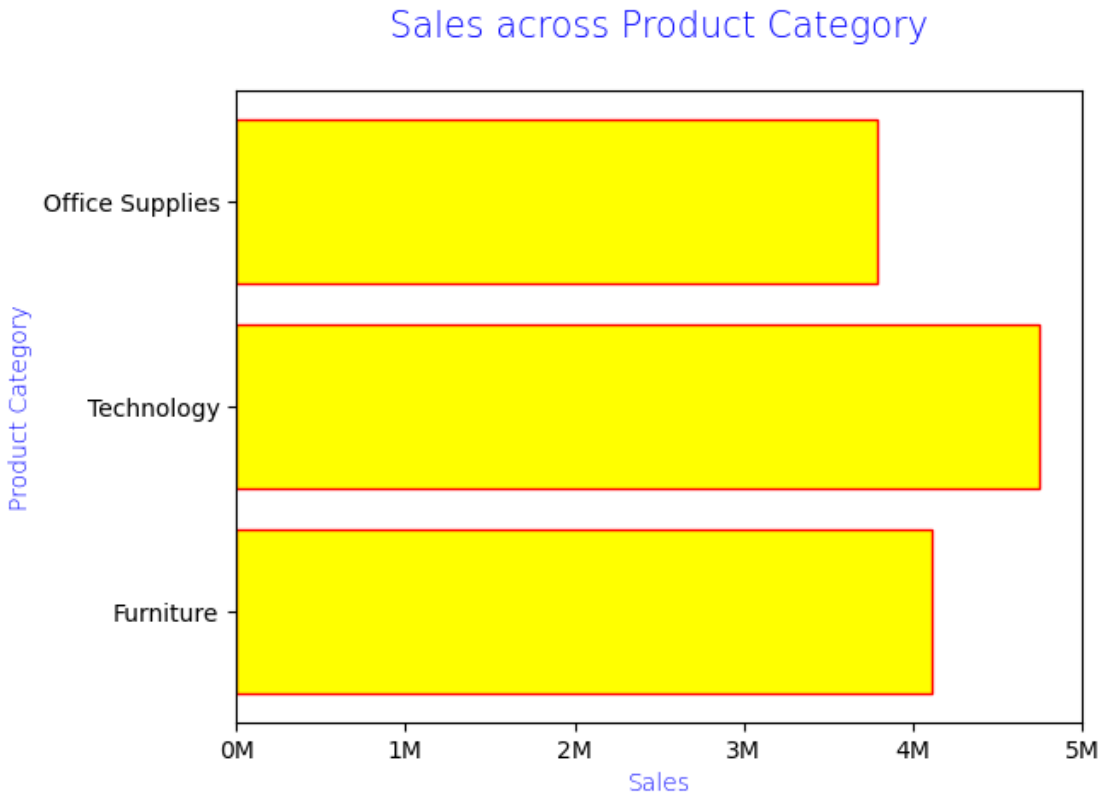
September 12, 2024

0.0.1 Data Visualizations

[2]:
```
#Importing necessary libraries

import numpy as np, pandas as pd
import matplotlib.pyplot as plt

# Data
product_category = np.array(['Furniture', 'Technology', 'Office Supplies'])
sales = np.array ([4110451.90, 4744557.50, 3787492.52] )

# plotting the "bar" graph
plt.bar(product_category, sales, align = "center", width = 0.5, color = 'cyan',␣
 ↪edgecolor='orange')
plt.title("Sales across Product Category\n", fontdict = {'fontsize':
 ↪15,'fontweight':20,'color':'b'})
plt.ylabel("Sales", fontdict = {'fontsize':10,'fontweight':15,'color':'b'})
plt.xlabel("Product Category", fontdict = {'fontsize':10,'fontweight':
 ↪15,'color':'b'})

# modify the y-axis scale
tick = np.arange(0,6000000,1000000)
labels = ["{}M".format(i // 1000000) for i in tick]
plt.yticks(tick,labels)

plt.show()
```



[15]:
```
# plotting the "bar" graph
plt.barh(product_category, sales, align = "center", color = 'yellow',␣
 ↪edgecolor='red')
plt.title("Sales across Product Category\n", fontdict = {'fontsize':
 ↪15,'fontweight':20,'color':'b'})
plt.xlabel("Sales", fontdict = {'fontsize':10,'fontweight':15,'color':'b'})
plt.ylabel("Product Category", fontdict = {'fontsize':10,'fontweight':
 ↪15,'color':'b'})

# modify the y-axis scale
tick = np.arange(0,6000000,1000000)
labels = ["{}M".format(i // 1000000) for i in tick]
plt.xticks(tick,labels)

plt.show()
```


Sales across Product Category
Office Supplies
Technology
Furniture
Product Category
0M
1M
2M
3M
4M
5M
Sales

[23]:
```
# Data
```

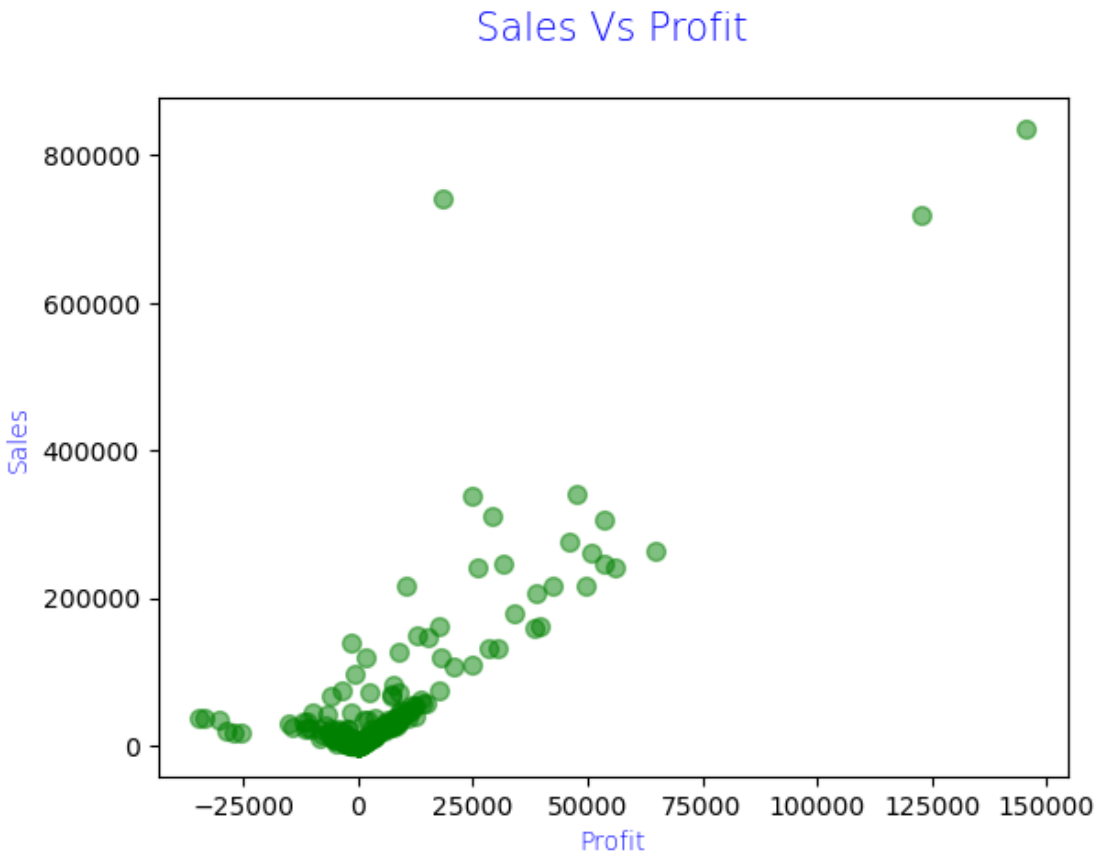
```
sales = np.array ([1013.14, 8298.48, 875.51, 22320.83, 9251.6, 4516.86, 585.16,␣
 ↪836154.03, 216748.48, 174.2, 27557.79, 563.25, 558.11, 37117.45, 357.36,␣
 ↪2206.96, 709.5, 35064.03, 7230.78, 235.33, 148.32, 3973.27, 11737.8, 7104.
 ↪63, 83.67, 5569.83, 92.34, 107104.36, 1045.62, 9072.51, 42485.82, 5093.82,␣
 ↪14846.16, 943.92, 684.36, 15012.03, 38196.18, 2448.75, 28881.96, 13912.14,␣
 ↪4507.2, 4931.06, 12805.05, 67912.73, 4492.2, 1740.01, 458.04, 16904.32,␣
 ↪21744.53, 10417.26, 18665.33, 2808.42, 54195.57, 67332.5, 24390.95, 1790.43,␣
 ↪2234.19, 9917.5, 7408.14, 36051.99, 1352.22, 1907.7, 245722.14, 2154.66,␣
 ↪1078.21, 3391.65, 28262.73, 5177.04, 66.51, 2031.34, 1683.72, 1970.01, 6515.
 ↪82, 1055.31, 1029.48, 5303.4, 1850.96, 1159.41, 39989.13, 1183.87, 96365.09,␣
 ↪8356.68, 7010.24, 23119.23, 46109.28, 146071.84, 242259.03, 9058.95, 1313.
 ↪67, 31525.06, 2019.94, 703.04, 1868.79, 700.5, 55512.02, 243.5, 2113.18,␣
 ↪11781.81, 262189.49, 3487.29, 513.12, 312050.42, 5000.7, 121.02, 1302.78,␣
 ↪169.92, 124.29, 57366.05, 29445.93, 4614.3, 45009.98, 309.24, 3353.67, 41348.
 ↪34, 2280.27, 61193.7, 1466.79, 12419.94, 445.12, 25188.65, 263514.92, 12351.
 ↪23, 1152.3, 26298.81, 9900.78, 5355.57, 2325.66, 6282.81, 127707.92, 1283.1,␣
 ↪3560.15, 3723.84, 13715.01, 4887.9, 3396.89, 33348.42, 625.02, 1665.48,␣
 ↪32486.97, 340212.44, 20516.22, 8651.16, 13590.06, 2440.35, 6462.57, 1770.13,␣
 ↪7527.18, 1433.65, 423.3, 21601.72, 10035.72, 2378.49, 3062.38, 719469.32,␣
 ↪179366.79, 345.17, 30345.78, 300.71, 940.81, 36468.08, 1352.85, 1755.72,␣
 ↪2391.96, 19.98, 19792.8, 15633.88, 7.45, 521.67, 1118.24, 7231.68, 12399.32,␣
 ↪204.36, 23.64, 5916.48, 313.98, 108181.5, 9212.42, 27476.91, 1761.33, 289.5,␣
 ↪780.3, 15098.46, 813.27, 47.55, 8323.23, 22634.64, 1831.02, 28808.1, 10539.
 ↪78, 588.99, 939.78, 7212.41, 15683.01, 41369.09, 5581.6, 403.36, 375.26,␣
 ↪12276.66, 15393.56, 76.65, 5884.38, 18005.49, 3094.71, 43642.78, 35554.83,␣
 ↪22977.11, 1026.33, 665.28, 9712.49, 6038.52, 30756.51, 3758.25, 4769.49,␣
 ↪2463.3, 160153.16, 967.11, 2311.74, 1414.83, 12764.91, 4191.24, 110.76, 637.
 ↪34, 1195.12, 2271.63, 804.12, 196.17, 167.67, 131.77, 2842.05, 9969.12, 1784.
 ↪35, 3098.49, 25005.54, 1300.1, 118697.39, 7920.54, 6471.78, 31707.57, 37636.
 ↪47, 118777.77, 131170.76, 3980.88, 3339.39, 26563.9, 4038.73, 124.8, 196.65,␣
 ↪2797.77, 29832.76, 184.84, 79.08, 8047.83, 205313.25, 1726.98, 899.73, 224.
 ↪06, 304763.54, 6101.31, 729.6, 896.07, 17.82, 26.22, 46429.78, 31167.27,␣
 ↪2455.94, 37714.3, 1506.93, 3812.78, 25223.34, 3795.96, 437.31, 41278.86,␣
 ↪2091.81, 6296.61, 468.82, 23629.64, 160435.53, 9725.46, 1317.03, 1225.26,␣
 ↪30034.08, 7893.45, 2036.07, 215.52, 3912.42, 82783.43, 253.14, 966.96, 3381.
 ↪26, 164.07, 1984.23, 75.12, 25168.17, 3295.53, 991.12, 10772.1, 44.16, 1311.
 ↪45, 35352.57, 245783.54, 20.49, 13471.06, 8171.16, 14075.67, 611.82, 3925.
 ↪56, 981.84, 10209.84, 156.56, 243.06, 21287.52, 7300.51, 434.52, 6065.0,␣
 ↪741577.51, 132461.03, 224.75, 28953.6, 757.98, 528.15, 34922.41, 50.58, 2918.
 ↪48, 1044.96, 22195.13, 3951.48, 6977.64, 219.12, 5908.38, 10987.46, 4852.26,␣
 ↪445.5, 71860.82, 14840.45, 24712.08, 1329.9, 1180.44, 85.02, 10341.63, 690.
 ↪48, 1939.53, 20010.51, 914.31, 25223.82, 12804.66, 2124.24, 602.82, 2961.66,␣
 ↪15740.79, 74138.35, 7759.39, 447.0, 2094.84, 22358.95, 21734.53, 4223.73,␣
 ↪17679.53, 1019.85, 51848.72, 69133.3, 30146.9, 705.48, 14508.88, 7489.38,␣
 ↪20269.44, 246.12, 668.13, 768.93, 215677.35, 899.16, 2578.2, 4107.99, 20334.
 ↪57, 366.84, 3249.27, 98.88, 3497.88, 3853.05, 786.75, 1573.68, 458.36, 1234.
```

```
profit = np.array([-1213.46, 1814.13, -1485.7, -2286.73, -2872.12, 946.8, 198.
↪48, 145454.95, 49476.1, -245.56, 5980.77, -790.47, -895.72, -34572.08, 117.
↪9, 561.96, 152.85, 1426.05, 1873.17, -251.03, 68.22, 635.11, 3722.4, -3168.
↪63, 27.6, 952.11, 7.38, 20931.13, 186.36, -5395.38, 9738.45, 525.27, 3351.
↪99, 120.78, 266.88, 3795.21, 8615.97, 609.54, 7710.57, 2930.43, 1047.96,␣
↪-2733.32, 2873.73, -5957.89, -909.6, 163.41, -376.02, -6322.68, -10425.86,␣
↪2340.36, -28430.53, 756.12, 12633.33, 7382.54, -14327.69, 436.44, 683.85,␣
↪-694.91, 1960.56, 10925.82, 334.08, 425.49, 53580.2, 1024.56, 110.93, 632.
↪22, 8492.58, 1418.88, 19.26, -2567.57, 346.26, 601.86, 1318.68, 304.05, 428.
↪37, 1416.24, -2878.18, 283.41, 12611.04, 261.95, -648.43, 1112.88, -2640.29,␣
↪6154.32, 11558.79, 15291.4, 56092.65, 1515.39, 342.03, -10865.66, -902.8,␣
↪351.52, 364.17, 87.72, 11565.66, 75.4, 289.33, 3129.63, 50795.72, 783.72,␣
↪215.46, 29196.89, 1147.26, 53.22, 286.56, 73.02, 42.24, 13914.85, 5754.54,␣
↪998.04, -1476.04, 86.58, -1636.35, 10511.91, 647.34, 13768.62, 338.67, 3095.
↪67, 173.84, 5632.93, 64845.11, 3297.33, 338.61, 7246.62, 2255.52, 1326.36,␣
↪827.64, 1100.58, 9051.36, 412.23, 1063.91, 940.59, 3891.84, 1599.51, 1129.
↪57, 8792.64, 6.24, 592.77, 8792.85, 47727.5, -4597.68, 2242.56, 3546.45, 321.
↪87, 1536.72, -2463.29, 1906.08, -1916.99, 186.24, 3002.05, -3250.98, 554.7,␣
↪830.64, 122612.79, 33894.21, -559.03, 7528.05, -477.67, -1660.25, -33550.96,␣
↪481.68, 425.08, 450.3, 9.57, -3025.29, 2924.62, -11.84, 87.36, 26.51, 1727.
↪19, -6131.18, 59.16, 3.06, 1693.47, 74.67, 24729.21, -4867.94, 6705.18, 410.
↪79, 70.74, 101.7, 3264.3, 137.01, 6.18, 2100.21, 5295.24, 520.29, 7205.52,␣
↪2602.65, 116.67, 224.91, -5153.93, 3882.69, -6535.24, -1254.1, 84.56, -186.
↪38, -3167.2, -7935.59, 37.02, 1908.06, -27087.84, 829.32, 8727.44, 2011.47,␣
↪-11629.64, 234.96, 53.1, 1248.14, 1511.07, 7374.24, 1193.28, 1090.23, 553.
↪86, 38483.86, 255.81, 528.54, 326.07, 3924.36, 1018.92, 36.48, 113.24, -1770.
↪05, 527.64, 224.49, 79.53, 64.77, 38.08, 868.08, 2265.06, -2643.62, 833.73,␣
↪5100.03, 326.44, 18158.84, 1682.01, -3290.22, 8283.33, 7926.18, 1694.41,␣
↪30522.92, 1214.07, 900.6, -6860.8, -865.91, 26.16, 47.22, 863.52, 7061.26,␣
↪73.92, 33.12, 1801.23, 38815.44, 431.13, 216.81, 16.5, 53688.2, 1210.32, 236.
↪94, 210.84, 3.18, 2.22, 10265.64, 7212.3, 343.56, 3898.28, 568.11, -1867.85,␣
↪5782.38, 697.29, -192.06, 10179.02, 616.32, 1090.47, 165.84, 6138.28, 39723.
↪06, 2085.14, 90.0, 129.93, 7957.53, 2131.86, 562.44, 99.12, 1298.37, 7580.
↪33, 113.73, 139.71, 456.0, 21.24, 292.68, 30.34, 5817.15, 1060.89, 252.9,␣
↪3060.61, 6.6, 219.09, 8735.82, 31481.09, 2.85, -3124.72, 2195.94, 3464.7,␣
↪141.12, 1125.69, -1752.03, 3281.52, -303.77, 114.18, -2412.63, -5099.61, 146.
↪64, 660.22, 18329.28, 28529.84, -232.27, 7435.41, -1157.94, -746.73, -30324.
↪2, 2.52, 1313.44, 213.72, -5708.95, 930.18, 1663.02, 31.59, 1787.88, -8219.
↪56, 973.92, 4.32, 8729.78, -2529.52, 5361.06, 69.21, 519.3, 13.56, 2236.77,␣
↪213.96, 367.98, 5074.2, 206.61, 7620.36, 2093.19, 164.07, 230.01, -815.82,␣
↪4226.7, -3635.09, -3344.17, 167.26, 143.79, -8233.57, -4085.21, 919.35,␣
↪-25232.35, 234.33, 12040.68, 7206.28, -15112.76, 206.04, -2662.49, 2346.81,␣
↪4461.36, 93.48, 82.11, 147.87, 10389.53, 395.58, 474.74, 1333.26, 3913.02,␣
↪117.36, 858.78, 6.9, -4628.49, 1170.6, 218.55, 539.58, -211.0, 438.87, 317.
↪16, 310.8, -1578.09, 706.56, 6617.4, 803.84, 2475.26, 764.34, -1461.88, 3805.
↪56, 7371.27, -1377.13, 42435.03, 472.47, 315.48, -11755.91, -2418.6, 6.36,␣
↪9317.76, 326.88, -287.31, 637.68, 17579.17, 70.83, 47.4, 26143.92, 1548.15,␣
↪612.78, 17842.76, 6735.39, 1206.5, -10035.74, 149.4, -777.85, 5566.29, 748.
↪92, 14941.58, 348.93, 1944.06, -5.51, 7026.84, 46114.92, 2361.86, 2613.24,␣
```

```
product_category = np.array(['Technology', 'Technology', 'Technology',␣
↪'Technology', 'Technology', 'Technology', 'Technology', 'Technology',␣
```

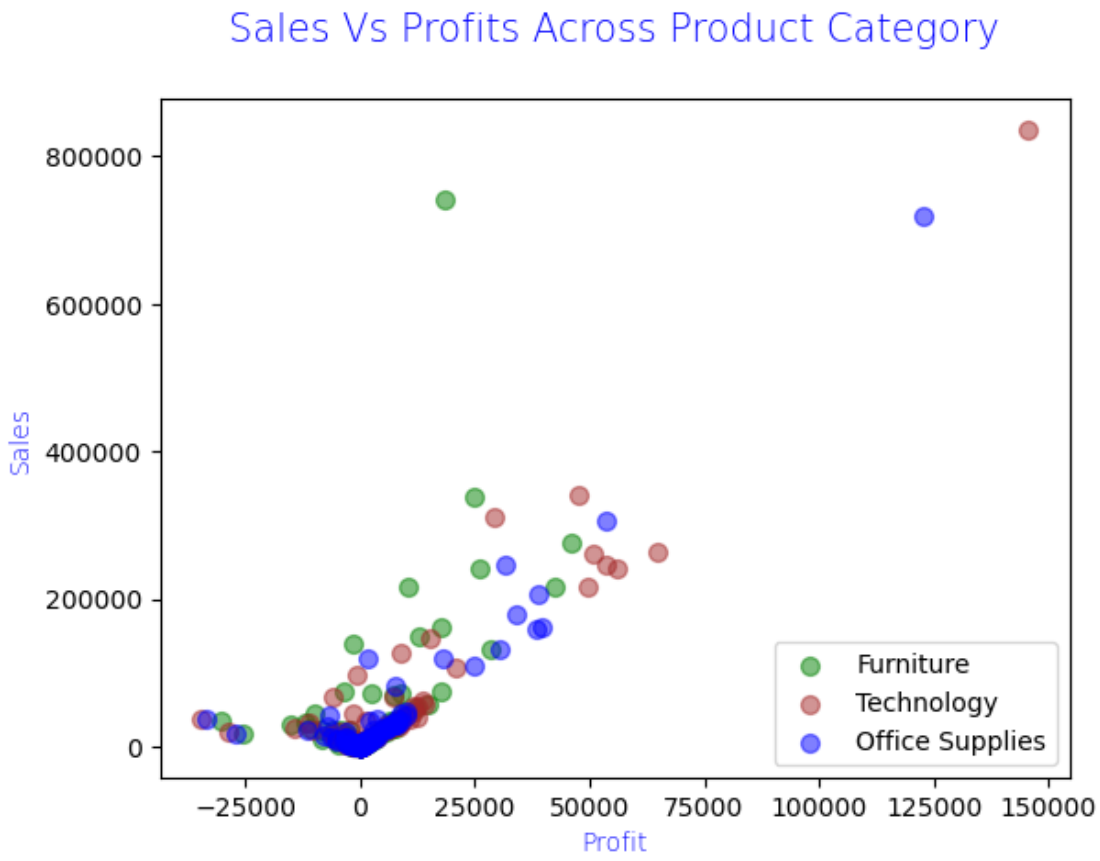
```
country = np.array(['Zimbabwe', 'Zambia', 'Yemen', 'Vietnam', 'Venezuela',␣
 ↪'Uzbekistan', 'Uruguay', 'United States', 'United Kingdom', 'United Arab␣
 ↪Emirates', 'Ukraine', 'Uganda', 'Turkmenistan', 'Turkey', 'Tunisia',␣
 ↪'Trinidad and Tobago', 'Togo', 'Thailand', 'Tanzania', 'Tajikistan',␣
 ↪'Taiwan', 'Syria', 'Switzerland', 'Sweden', 'Swaziland', 'Sudan', 'Sri␣
 ↪Lanka', 'Spain', 'South Sudan', 'South Korea', 'South Africa', 'Somalia',␣
 ↪'Singapore', 'Sierra Leone', 'Serbia', 'Senegal', 'Saudi Arabia', 'Rwanda',␣
 ↪'Russia', 'Romania', 'Qatar', 'Portugal', 'Poland', 'Philippines', 'Peru',␣
 ↪'Paraguay', 'Papua New Guinea', 'Panama', 'Pakistan', 'Norway', 'Nigeria',␣
 ↪'Niger', 'Nicaragua', 'New Zealand', 'Netherlands', 'Nepal', 'Namibia',␣
 ↪'Myanmar (Burma)', 'Mozambique', 'Morocco', 'Mongolia', 'Moldova', 'Mexico',␣
 ↪'Mauritania', 'Martinique', 'Mali', 'Malaysia', 'Madagascar', 'Luxembourg',␣
 ↪'Lithuania', 'Libya', 'Liberia', 'Lesotho', 'Lebanon', 'Kyrgyzstan',␣
 ↪'Kenya', 'Kazakhstan', 'Jordan', 'Japan', 'Jamaica', 'Italy', 'Israel',␣
 ↪'Ireland', 'Iraq', 'Iran', 'Indonesia', 'India', 'Hungary', 'Hong Kong',␣
 ↪'Honduras', 'Haiti', 'Guyana', 'Guinea-Bissau', 'Guinea', 'Guatemala',␣
 ↪'Guadeloupe', 'Greece', 'Ghana', 'Germany', 'Georgia', 'Gabon', 'France',␣
 ↪'Finland', 'Ethiopia', 'Estonia', 'Eritrea', 'Equatorial Guinea', 'El␣
 ↪Salvador', 'Egypt', 'Ecuador', 'Dominican Republic', 'Djibouti', 'Denmark',␣
 ↪'Democratic Republic of the Congo', 'Czech Republic', 'Cuba', 'Croatia',␣
 ↪"Cote d'Ivoire", 'Costa Rica', 'Colombia', 'China', 'Chile', 'Central␣
 ↪African Republic', 'Canada', 'Cameroon', 'Cambodia', 'Burkina Faso',␣
 ↪'Bulgaria', 'Brazil', 'Bosnia and Herzegovina', 'Bolivia', 'Benin',␣
 ↪'Belgium', 'Belarus', 'Barbados', 'Bangladesh', 'Bahrain', 'Azerbaijan',␣
```

```
# scatter plot
#  s = size of the dot, c =color of the dot , alpha = transparency of the dot
plt.scatter(profit,sales, s = 50, c = 'g', alpha = 0.5)
plt.title("Sales Vs Profit\n",fontdict = {'fontsize':15,'fontweight':20,'color':
  ↪'b'})
plt.ylabel("Sales",fontdict = {'fontsize':10,'fontweight':15,'color':'b'})
plt.xlabel("Profit",fontdict = {'fontsize':10,'fontweight':15,'color':'b'})
plt.show()
```



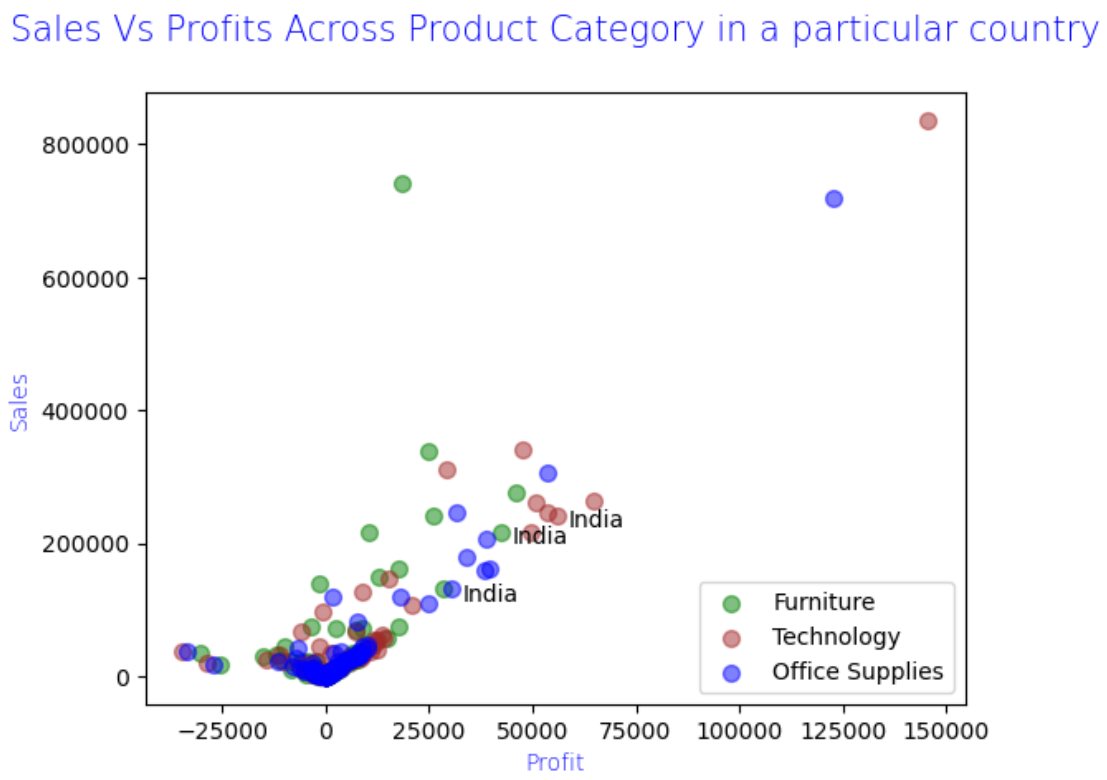
[37]:
```
#plot the scatter plot for Product category

plt.scatter(profit[product_category == 'Furniture'],sales[product_category ==␣
  ↪'Furniture'], s = 50, c = 'g', alpha = 0.5, label ='Furniture')
plt.scatter(profit[product_category == 'Technology'],sales[product_category ==␣
  ↪'Technology'], s = 50, c = 'brown', alpha = 0.5, label ='Technology')
```

```
plt.scatter(profit[product_category == 'Office␣
 ↪Supplies'],sales[product_category == 'Office Supplies'], s = 50, c = 'b',␣
 ↪alpha = 0.5,label ='Office Supplies')

plt.title("Sales Vs Profits Across Product Category\n",fontdict = {'fontsize':
 ↪15,'fontweight':20,'color':'b'})
plt.ylabel("Sales",fontdict = {'fontsize':10,'fontweight':15,'color':'b'})
plt.xlabel("Profit",fontdict = {'fontsize':10,'fontweight':15,'color':'b'})

plt.legend()
plt.show()
```



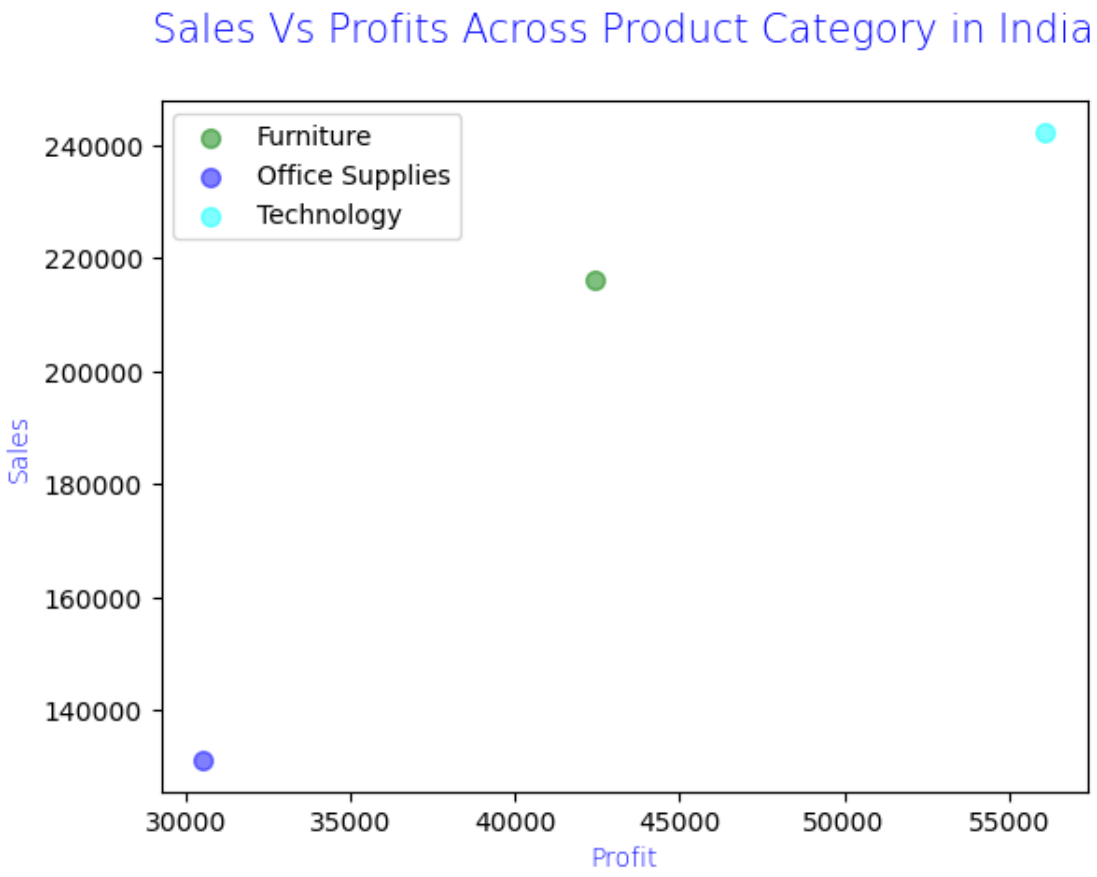
[41]:
```
# Plot scatter plot along with country

for xy in zip(profit[country == "India"], sales[country == "India"]):
    plt.annotate(text = "India", xy=xy , xytext = (5,-5), textcoords = 'offset␣
 ↪points')
```

```
plt.scatter(profit[product_category == 'Furniture'],sales[product_category ==␣
 ↪'Furniture'], s = 50, c = 'g', alpha = 0.5, label ='Furniture')
plt.scatter(profit[product_category == 'Technology'],sales[product_category ==␣
 ↪'Technology'], s = 50, c = 'brown', alpha = 0.5, label ='Technology')
plt.scatter(profit[product_category == 'Office␣
 ↪Supplies'],sales[product_category == 'Office Supplies'], s = 50, c = 'b',␣
 ↪alpha = 0.5,label ='Office Supplies')

plt.title("Sales Vs Profits Across Product Category in a particular␣
 ↪country\n",fontdict = {'fontsize':15,'fontweight':20,'color':'b'})
plt.ylabel("Sales",fontdict = {'fontsize':10,'fontweight':15,'color':'b'})
plt.xlabel("Profit",fontdict = {'fontsize':10,'fontweight':15,'color':'b'})

plt.legend()
plt.show()
```



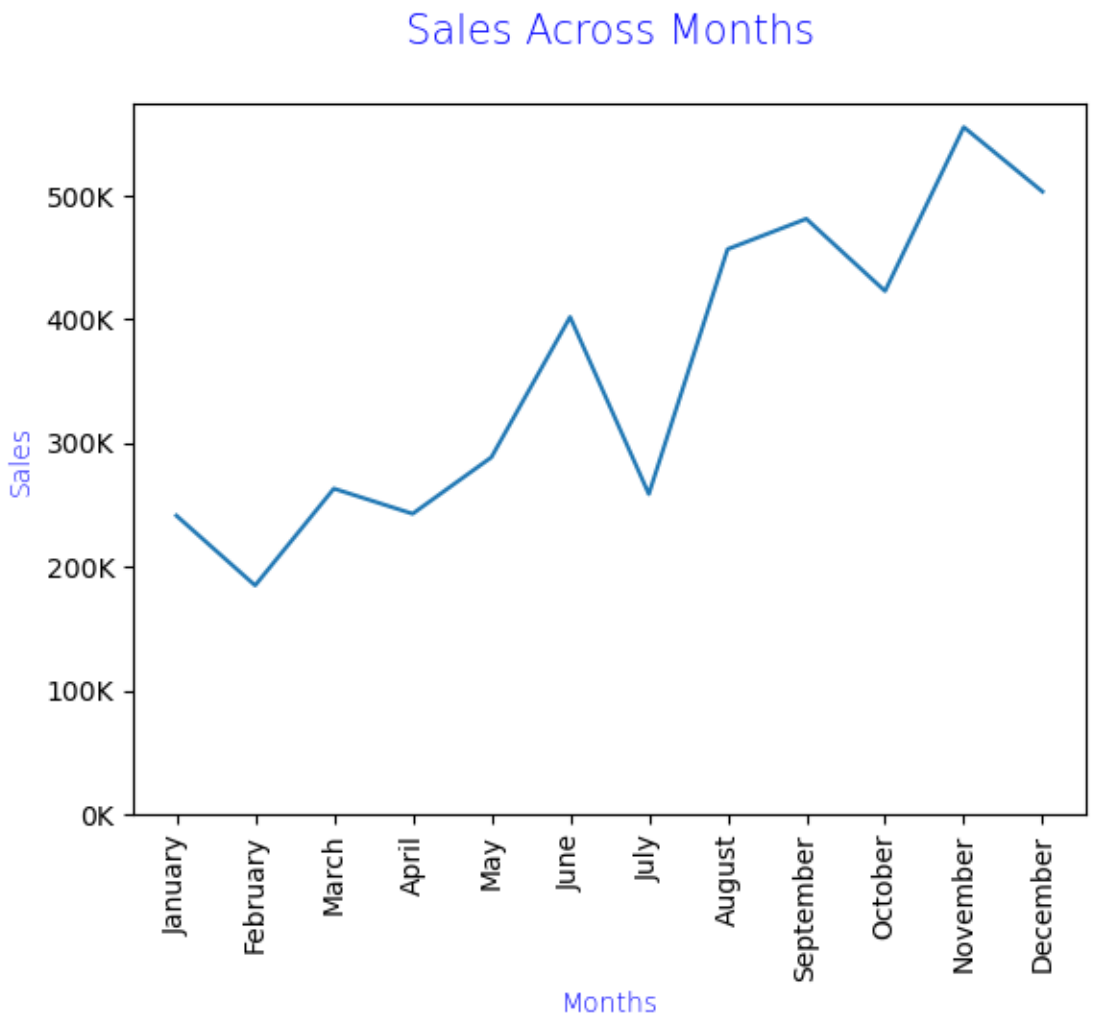
[47]:
```
# filtering the data for a particular country

furniture_a = (product_category == 'Furniture') & (country == "India")
office_supplies_a = (product_category == 'Office Supplies') & (country ==␣
 ↪"India")
technology_a = (product_category == 'Technology') & (country == "India")
```

```
plt.scatter(profit[furniture_a], sales[furniture_a], alpha = 0.5, s = 50, label␣
 ↪= "Furniture", c = 'g')
plt.scatter(profit[office_supplies_a], sales[office_supplies_a], alpha = 0.5, s␣
 ↪= 50, label = "Office Supplies", c = 'b')
plt.scatter(profit[technology_a], sales[technology_a], alpha = 0.5, s = 50,␣
 ↪label = "Technology", c = 'cyan')

plt.title("Sales Vs Profits Across Product Category in India\n",fontdict =␣
 ↪{'fontsize':15,'fontweight':20,'color':'b'})
plt.ylabel("Sales",fontdict = {'fontsize':10,'fontweight':15,'color':'b'})
plt.xlabel("Profit",fontdict = {'fontsize':10,'fontweight':15,'color':'b'})

plt.legend()
plt.show()
```

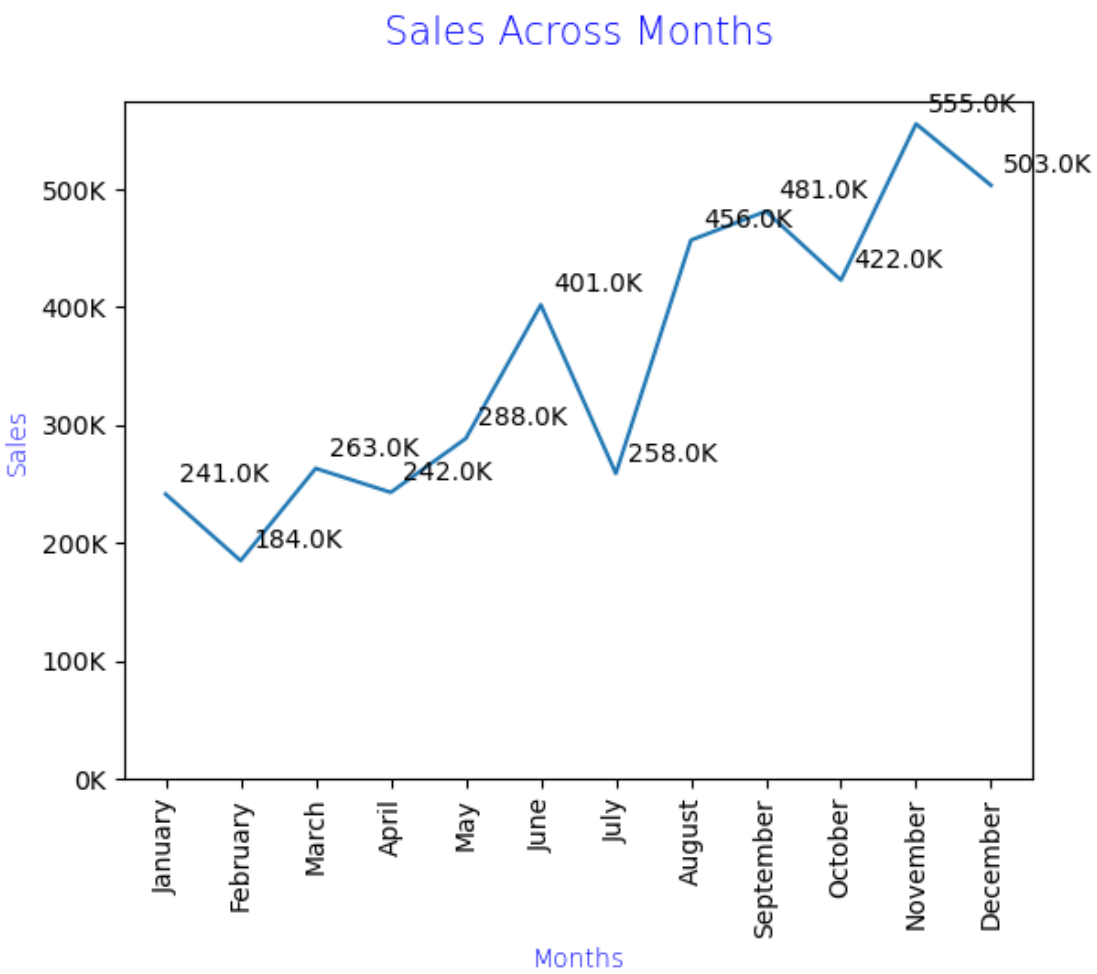


[63]:
```
# Data

# Line graph
```

```
months = np.array(['January', 'February', 'March', 'April', 'May', 'June',␣
 ↪'July', 'August', 'September', 'October', 'November', 'December'])
sales = np.array([241268.56, 184837.36, 263100.77, 242771.86, 288401.05, 401814.
 ↪06, 258705.68, 456619.94, 481157.24, 422766.63, 555279.03, 503143.69])

plt.plot(months, sales)
plt.title("Sales Across Months\n",fontdict = {'fontsize':15,'fontweight':
 ↪20,'color':'b'})
plt.ylabel("Sales",fontdict = {'fontsize':10,'fontweight':15,'color':'b'})
plt.xlabel("Months",fontdict = {'fontsize':10,'fontweight':15,'color':'b'})


plt.xticks(rotation = 90)
ticks = np.arange(0,600000,100000)
labels = ["{}K".format(i // 1000) for i in ticks]
plt.yticks(ticks, labels)
plt.show()
```

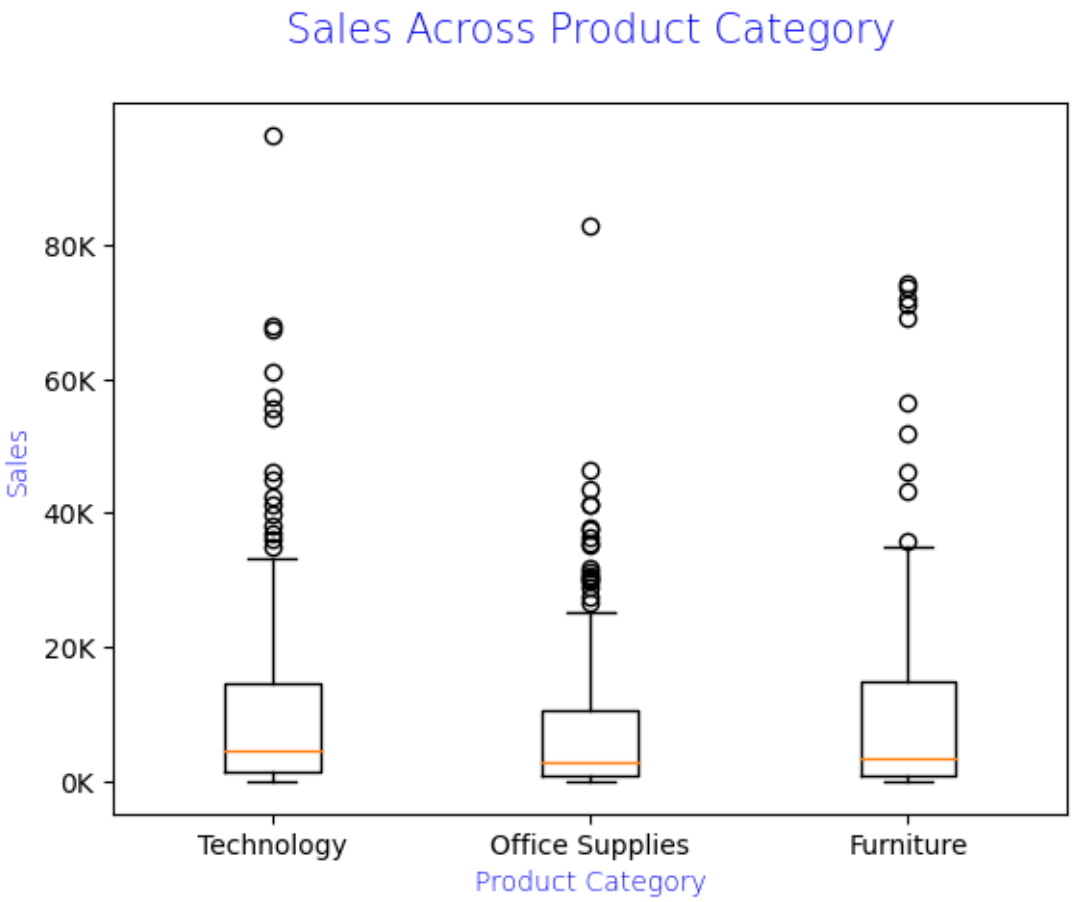


[73]:
```
plt.plot(months, sales)
plt.title("Sales Across Months\n",fontdict = {'fontsize':15,'fontweight':
 ↪20,'color':'b'})
plt.ylabel("Sales",fontdict = {'fontsize':10,'fontweight':15,'color':'b'})
plt.xlabel("Months",fontdict = {'fontsize':10,'fontweight':15,'color':'b'})


plt.xticks(rotation = 90)
ticks = np.arange(0,600000,100000)
labels = ["{}K".format(i // 1000) for i in ticks]
plt.yticks(ticks, labels)

for xy in zip(months,sales):
    plt.annotate(text = "{}K".format(xy[1]// 1000), xy = xy , xytext = (5,5),␣
 ↪textcoords = "offset points")
plt.show()
```



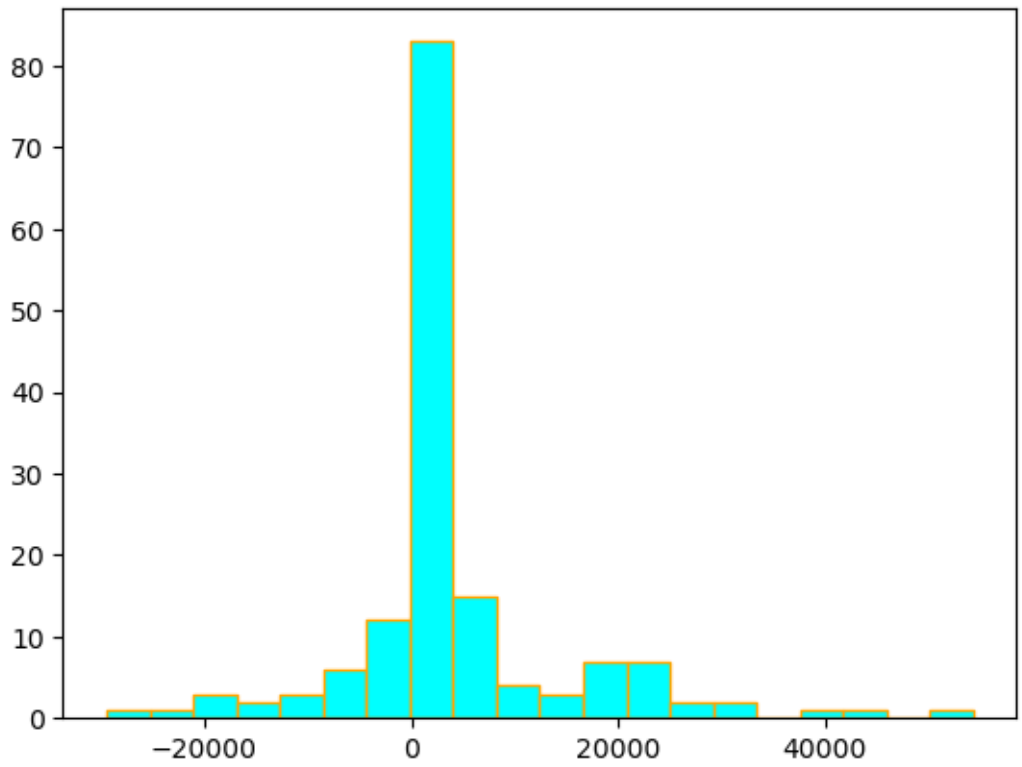
[83]:
```
# Data
sales_technology = np.array ([1013.14, 8298.48, 875.51, 22320.83, 9251.6, 4516.
↪86, 585.16, 174.2, 27557.79, 563.25, 558.11, 37117.45, 357.36, 2206.96, 709.
↪5, 35064.03, 7230.78, 235.33, 148.32, 3973.27, 11737.8, 7104.63, 83.67, 5569.
↪83, 92.34, 1045.62, 9072.51, 42485.82, 5093.82, 14846.16, 943.92, 684.36,␣
↪15012.03, 38196.18, 2448.75, 28881.96, 13912.14, 4507.2, 4931.06, 12805.05,␣
↪67912.73, 4492.2, 1740.01, 458.04, 16904.32, 21744.53, 10417.26, 18665.33,␣
↪2808.42, 54195.57, 67332.5, 24390.95, 1790.43, 2234.19, 9917.5, 7408.14,␣
↪36051.99, 1352.22, 1907.7, 2154.66, 1078.21, 3391.65, 28262.73, 5177.04, 66.
↪51, 2031.34, 1683.72, 1970.01, 6515.82, 1055.31, 1029.48, 5303.4, 1850.96,␣
↪1159.41, 39989.13, 1183.87, 96365.09, 8356.68, 7010.24, 23119.23, 46109.28,␣
↪9058.95, 1313.67, 31525.06, 2019.94, 703.04, 1868.79, 700.5, 55512.02, 243.
↪5, 2113.18, 11781.81, 3487.29, 513.12, 5000.7, 121.02, 1302.78, 169.92, 124.
↪29, 57366.05, 29445.93, 4614.3, 45009.98, 309.24, 3353.67, 41348.34, 2280.
↪27, 61193.7, 1466.79, 12419.94, 445.12, 25188.65, 12351.23, 1152.3, 26298.
↪81, 9900.78, 5355.57, 2325.66, 6282.81, 1283.1, 3560.15, 3723.84, 13715.01,␣
↪4887.9, 3396.89, 33348.42, 625.02, 1665.48, 32486.97, 20516.22, 8651.16,␣
↪13590.06, 2440.35, 6462.57])
sales_office_supplies = np.array ([1770.13, 7527.18, 1433.65, 423.3, 21601.72,␣
↪10035.72, 2378.49, 3062.38, 345.17, 30345.78, 300.71, 940.81, 36468.08, 1352.
↪85, 1755.72, 2391.96, 19.98, 19792.8, 15633.88, 7.45, 521.67, 1118.24, 7231.
↪68, 12399.32, 204.36, 23.64, 5916.48, 313.98, 9212.42, 27476.91, 1761.33,␣
↪289.5, 780.3, 15098.46, 813.27, 47.55, 8323.23, 22634.64, 1831.02, 28808.1,␣
↪10539.78, 588.99, 939.78, 7212.41, 15683.01, 41369.09, 5581.6, 403.36, 375.
↪26, 12276.66, 15393.56, 76.65, 5884.38, 18005.49, 3094.71, 43642.78, 35554.
↪83, 22977.11, 1026.33, 665.28, 9712.49, 6038.52, 30756.51, 3758.25, 4769.49,␣
↪2463.3, 967.11, 2311.74, 1414.83, 12764.91, 4191.24, 110.76, 637.34, 1195.
↪12, 2271.63, 804.12, 196.17, 167.67, 131.77, 2842.05, 9969.12, 1784.35, 3098.
↪49, 25005.54, 1300.1, 7920.54, 6471.78, 31707.57, 37636.47, 3980.88, 3339.
↪39, 26563.9, 4038.73, 124.8, 196.65, 2797.77, 29832.76, 184.84, 79.08, 8047.
↪83, 1726.98, 899.73, 224.06, 6101.31, 729.6, 896.07, 17.82, 26.22, 46429.78,␣
↪31167.27, 2455.94, 37714.3, 1506.93, 3812.78, 25223.34, 3795.96, 437.31,␣
↪41278.86, 2091.81, 6296.61, 468.82, 23629.64, 9725.46, 1317.03, 1225.26,␣
↪30034.08, 7893.45, 2036.07, 215.52, 3912.42, 82783.43, 253.14, 966.96, 3381.
↪26, 164.07, 1984.23, 75.12, 25168.17, 3295.53, 991.12, 10772.1, 44.16, 1311.
↪45, 35352.57, 20.49, 13471.06, 8171.16, 14075.67, 611.82, 3925.56])
```

```
sales_furniture = np.array ([981.84, 10209.84, 156.56, 243.06, 21287.52, 7300.
 ↪51, 434.52, 6065.0, 224.75, 28953.6, 757.98, 528.15, 34922.41, 50.58, 2918.
 ↪48, 1044.96, 22195.13, 3951.48, 6977.64, 219.12, 5908.38, 10987.46, 4852.26,␣
 ↪445.5, 71860.82, 14840.45, 24712.08, 1329.9, 1180.44, 85.02, 10341.63, 690.
 ↪48, 1939.53, 20010.51, 914.31, 25223.82, 12804.66, 2124.24, 602.82, 2961.66,␣
 ↪15740.79, 74138.35, 7759.39, 447.0, 2094.84, 22358.95, 21734.53, 4223.73,␣
 ↪17679.53, 1019.85, 51848.72, 69133.3, 30146.9, 705.48, 14508.88, 7489.38,␣
 ↪20269.44, 246.12, 668.13, 768.93, 899.16, 2578.2, 4107.99, 20334.57, 366.84,␣
 ↪3249.27, 98.88, 3497.88, 3853.05, 786.75, 1573.68, 458.36, 1234.77, 1094.22,␣
 ↪2300.61, 970.14, 3068.25, 35792.85, 4277.82, 71080.28, 3016.86, 3157.49,␣
 ↪15888.0, 30000.36, 1214.22, 1493.94, 32036.69, 4979.66, 106.02, 46257.68,␣
 ↪1033.3, 937.32, 3442.62, 213.15, 338.88, 9602.34, 2280.99, 73759.08, 23526.
 ↪12, 6272.74, 43416.3, 576.78, 1471.61, 20844.9, 3497.7, 56382.38, 902.58,␣
 ↪6235.26, 48.91, 32684.24, 13370.38, 10595.28, 4555.14, 10084.38, 267.72,␣
 ↪1012.95, 4630.5, 364.32, 349.2, 4647.56, 504.0, 10343.52, 5202.66, 2786.26,␣
 ↪34135.95, 2654.58, 24699.51, 136.26, 23524.51, 8731.68, 8425.86, 835.95,␣
 ↪11285.19])


# Box Plots
plt.boxplot([sales_technology, sales_office_supplies, sales_furniture])

plt.title("Sales Across Product Category\n",fontdict = {'fontsize':
 ↪15,'fontweight':20,'color':'b'})
plt.ylabel("Sales",fontdict = {'fontsize':10,'fontweight':15,'color':'b'})
plt.xlabel("Product Category",fontdict = {'fontsize':10,'fontweight':15,'color':
 ↪'b'})

plt.xticks((1,2,3), ["Technology", "Office Supplies", "Furniture"])

ticks = np.arange(0,100000, 20000)
labels = ["{}K".format(i // 1000) for i in ticks]
plt.yticks(ticks, labels)

plt.show()
```


Sales Across Product Category
Sales
80K
60K
40K
20K
0K
Technology
Office Supplies
Furniture
Product Category

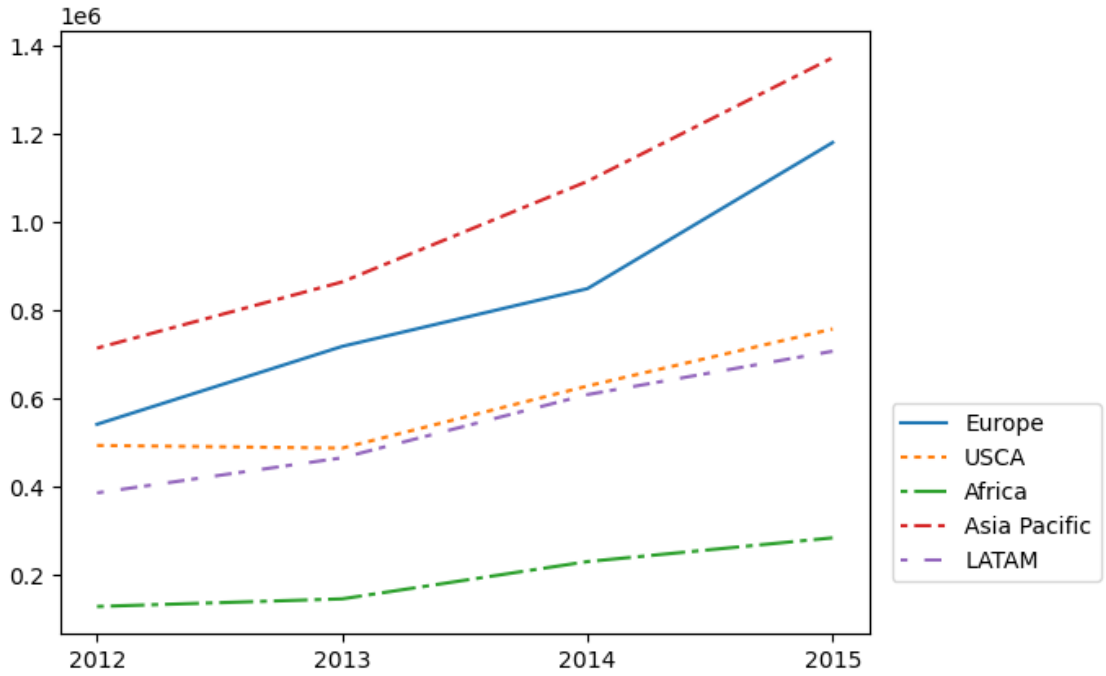
[89]:
```
# Data
```

```
profit = np.array([-5428.79, 7001.73, -3706.46, 300.42, -1697.31, -11222.71,␣
 ↪1648.14, 1689.34, -1036.86, 20944.23, -2426.09, -3302.71, 602.1, 2300.48,␣
 ↪816.87, 9.57, -7308.2, 5727.97, -262.87, 1818.6, 693.21, 7237.47, -17519.37,␣
 ↪86.76, 3.06, 3619.5, 86.37, 54390.12, 186.36, -12792.83, 21804.69, 1005.27,␣
 ↪590.04, 115.26, 8853.06, 471.75, 273.06, 6263.4, 18985.41, 1336.44, 22536.
 ↪45, 7626.27, 280.74, 1502.88, -8703.06, 10983.12, -16128.23, -5507.88, 415.
 ↪23, -418.61, -17723.45, -22446.65, 37.02, 5167.77, 1819.77, 33401.44, 16600.
 ↪28, 877.44, 736.95, -2109.26, 5818.44, 22761.42, 1286.76, 1506.42, 1127.22,␣
 ↪1675.95, 1114.21, 2291.55, 16329.96, 117.36, 3296.58, 43.38, 132.5, -8966.
 ↪12, 2044.5, 1044.9, 1398.21, 908.4, -172.92, 1735.32, 317.16, 3992.1, -7099.
 ↪9, 1823.7, 24328.47, 1392.23, 19985.68, 3559.23, -7392.38, 18243.21, 26856.
 ↪24, 15608.68, 3201.93, 1558.11, -29482.37, -4187.31, 384.04, 411.39, 951.24,␣
 ↪27944.69, 476.2, 35.14, 5568.54, 1285.68, 479.67, 16.5, 3905.73, 290.16,␣
 ↪1110.18, 76.2, 44.46, 42023.24, 19702.23, 2548.1, -7613.5, 804.09, -4282.05,␣
 ↪21860.58, 2093.55, -192.06, 38889.22, 1303.92, 6130.2, 334.17, 18798.05,␣
 ↪7744.33, 90.0, 468.54, 17817.39, 5664.75, 4476.54, 103.08, 1238.19, 3649.53,␣
 ↪29686.9, 131.94, 660.18, 2229.35, 21.24, 1349.19, 30.34, 11572.59, 4534.26,␣
 ↪2199.79, 19430.89, 12.84, 1831.05, 24341.7, 69.09, -18693.8, 6494.97, 9106.
 ↪5, 709.32, 5460.3])


# Histogram

plt.hist(profit, bins = 20, edgecolor = 'Orange', color = 'cyan')
plt.show()
```



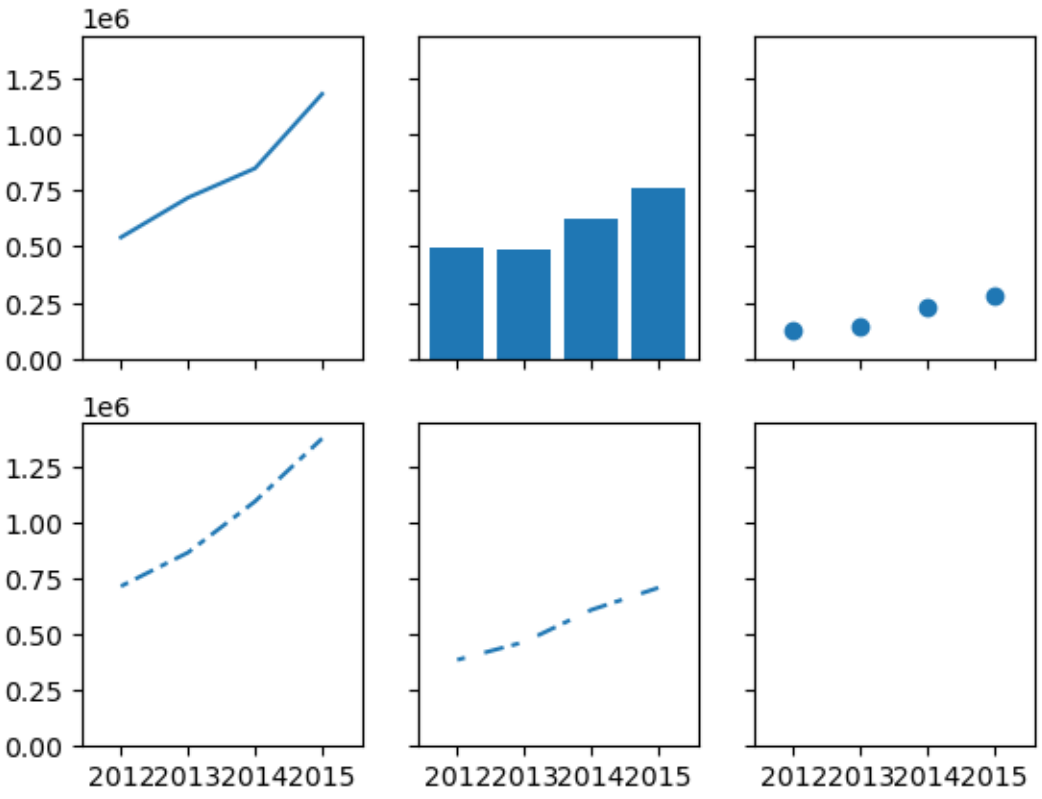
[91]:
```
# Data

years = np.array(['2012', '2013', '2014', '2015'])

sales_africa = np.array([127187.27, 144480.70, 229068.79, 283036.44])

sales_USCA = np.array([492756.60, 486629.30, 627634.98, 757108.13])

sales_LATAM = np.array([385098.15, 464733.29, 608140.77, 706632.93])

sales_Asia_Pacific = np.array([713658.22, 863983.97, 1092231.65, 1372784.40])

sales_Europe = np.array([540750.63, 717611.40, 848670.24, 1180303.95])

# Subplots

fig,ax = plt.subplots()

europe, = ax.plot(years, sales_Europe)
europe.set_label("Europe")

usca, = ax.plot(years,sales_USCA)
```

```
usca.set_label("USCA")
usca.set_dashes([2,2,2,2])

africa, = ax.plot(years,sales_africa)
africa.set_label("Africa")
africa.set_dashes([2,2,10,2])

asia, = ax.plot(years,sales_Asia_Pacific)
asia.set_label("Asia Pacific")
asia.set_dashes([2,2,5,2])

latam, = ax.plot(years, sales_LATAM)
latam.set_label("LATAM")
latam.set_dashes([2,5,5,2])

plt.legend()
plt.legend(bbox_to_anchor = (1.30,0.4))

plt.show()
```

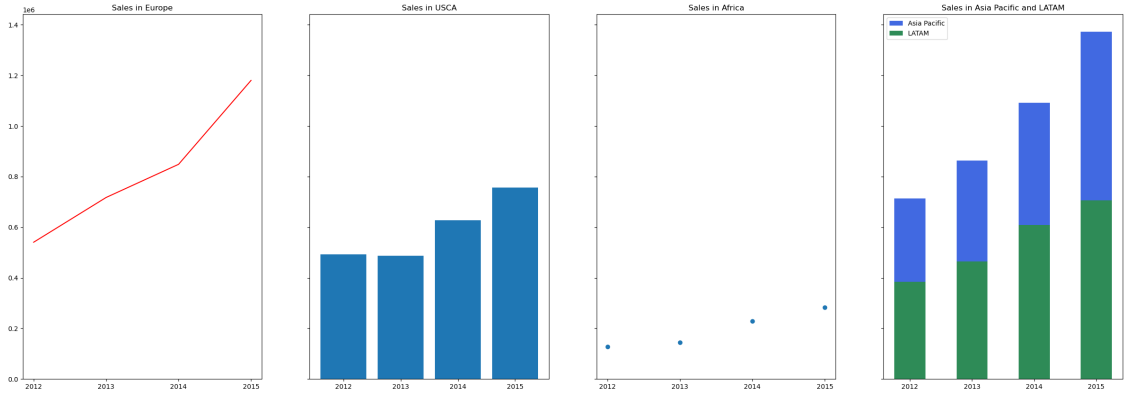


[99]:
```
# To plot the subplots in different graphs

fig,ax = plt.subplots(ncols = 3, nrows=2, sharex= True, sharey = True)

europe, = ax[0][0].plot(years, sales_Europe)
```

```
europe.set_label("Europe")

usca = ax[0][1].bar(years,sales_USCA)
usca.set_label("USCA")


africa = ax[0][2].scatter(years,sales_africa)
africa.set_label("Africa")


asia, = ax[1][0].plot(years,sales_Asia_Pacific)
asia.set_label("Asia Pacific")
asia.set_dashes([2,2,5,2])

latam, = ax[1][1].plot(years, sales_LATAM)
latam.set_label("LATAM")
latam.set_dashes([2,5,5,2])


plt.show()
```



[110]:
```
fig,ax = plt.subplots(ncols = 4, sharey = True)

europe, = ax[0].plot(years, sales_Europe)
europe.set_label("Europe")
europe.set_color("red")
ax[0].set_title("Sales in Europe")

usca = ax[1].bar(years,sales_USCA)
usca.set_label("USCA")
ax[1].set_title("Sales in USCA")

africa = ax[2].scatter(years,sales_africa)
africa.set_label("Africa")
ax[2].set_title("Sales in Africa")

asia = ax[3].bar(years,sales_Asia_Pacific, width = 0.5, color = 'royalblue')
latam = ax[3].bar(years, sales_LATAM, width = 0.5, color = 'seagreen')

ax[3].set_title("Sales in Asia Pacific and LATAM")
ax[3].legend((asia[0],latam[0]), ("Asia Pacific", ("LATAM")))

fig.set_size_inches(30,10,forward = True)

plt.show()
```



[ ]: