Plotting Data using Matplotlib

Standard difficulty · 20 questions · 40 marks · Time: 38 minutes

Name: _____ Date: _____ Score: ____ / 40

Show your working for Sections B and C. Answers are on the last page — try every question first!

Section A — Choose the correct answer 8 × 1 = 8 marks

1. The usual way to import the plotting module of Matplotlib is:

(a) import pyplot.matplotlib **(b)** include matplotlib

(c) import matplotlib as pd **(d)** import matplotlib.pyplot as plt

2. Which function would you use to draw a chart of the number of students in each house of a school?

(a) plt.bar() **(b)** plt.scatter() **(c)** plt.pie() **(d)** plt.barh()

3. Which statement shows a box naming each line by its label?

(a) plt.show() **(b)** plt.xticks() **(c)** plt.xlabel() **(d)** plt.legend()

4. How many values fall in the bar for the bin 35–40 in this histogram?

```
import matplotlib.pyplot as plt
data = [32, 31, 32, 30, 40, 29, 24, 20, 31, 33, 35]
plt.hist(data, bins=[20, 25, 30, 35, 40])
plt.show()
```

(a) 3 **(b)** 6 **(c)** 1 **(d)** 2

5. At which point is the line highest?

```
import matplotlib.pyplot as plt
x = ['Jan', 'Feb', 'Mar', 'Apr', 'May', 'Jun']
y = [63, 71, 75, 76, 13, 38]
plt.plot(x, y, marker='o')
plt.show()
```

(a) Mar **(b)** Feb **(c)** Jan **(d)** Apr

6. A DataFrame df has 7 rows and the columns Name, Q1, Q2, Q3 and Q4. How many bars does this statement draw?

```
df.plot(kind='bar', x='Name', y='Q4')
```

(a) 8 **(b)** 28 **(c)** 7 **(d)** 1

7. In a plotting statement, what does the argument edgecolor='black' do?

(a) draws a black border around each bar

(b) makes the pandas plot() function draw a histogram

(c) makes the point markers bigger

(d) makes the pandas plot() function draw a bar chart

8. Which bar is the tallest?

```
import matplotlib.pyplot as plt
x = ['Red', 'Blue', 'Green', 'Yellow', 'Orange', 'Purple']
h = [56, 30, 32, 17, 23, 22]
plt.bar(x, h)
plt.show()
```

(a) Red **(b)** Blue **(c)** Purple **(d)** Orange

Section B — Short answer 8 × 2 = 16 marks

9. What is the purpose of plotting data?

10. How many bars in this chart are taller than 37?

```
import matplotlib.pyplot as plt
x = ['Mon', 'Tue', 'Wed', 'Thu', 'Fri']
h = [21, 49, 36, 34, 37]
plt.bar(x, h)
plt.show()
```

11. Write the height of the bar for the bin 10–20.

```
import matplotlib.pyplot as plt
data = [24, 40, 24, 40, 36, 40, 30, 21, 20, 14, 39]
plt.hist(data, bins=[10, 20, 30, 40])
plt.show()
```

12. Fill in the blank so that the statement names the y-axis “Sales”.

```
plt._____('Sales')
```

13. What is the y value of the point plotted at May?

```
import matplotlib.pyplot as plt
x = ['Jan', 'Feb', 'Mar', 'Apr', 'May']
y = [79, 20, 35, 41, 25]
plt.plot(x, y, marker='o')
plt.show()
```

14. Which bar is the shortest?

```
import matplotlib.pyplot as plt
x = ['Pens', 'Books', 'Bags', 'Bottles']
h = [47, 53, 45, 27]
plt.bar(x, h)
plt.show()
```

15. What is the total height of all the bars in this histogram (the number of values counted)?

```
import matplotlib.pyplot as plt
data = [19, 30, 24, 30, 19, 28, 19, 27, 15, 17, 25, 15, 30]
plt.hist(data, bins=[15, 20, 25, 30])
plt.show()
```

16. In how many places does this line go down from one point to the next?

```
import matplotlib.pyplot as plt
x = ['Jan', 'Feb', 'Mar', 'Apr', 'May', 'Jun', 'Jul']
y = [48, 67, 51, 25, 73, 69, 31]
plt.plot(x, y, marker='o')
plt.show()
```

Section C — Word problems — 4 × 4 = 16 marks

17. Write a program to plot the marks of a student in five subjects as a bar chart with a title, axis labels and red bars.

18. Write a program to draw a bar chart of these values with the title “Students in each club”, the x-axis named “Category”, the y-axis named “Value”, blue bars, and save it as chart.png.
Mon: 32, Tue: 44, Wed: 26, Thu: 34

19. Write the height of each bar of this histogram.

```
import matplotlib.pyplot as plt
data = [22, 61, 22, 80, 50, 40, 70, 30, 44, 47, 75, 80, 31]
plt.hist(data, bins=[20, 40, 60, 80])
plt.show()
```

(a) 20–40 (b) 40–60 (c) 60–80

20.

```
import matplotlib.pyplot as plt
m = ['Jan', 'Feb', 'Mar', 'Apr', 'May', 'Jun']
a = [42, 53, 79, 83, 73, 56]
b = [79, 42, 61, 86, 81, 76]
plt.plot(m, a, label='Shop A')
plt.plot(m, b, label='Canteen', linestyle='dashed')
plt.legend()
plt.show()
```

(a) In which month is the Shop A line highest?

(b) In how many months is the dashed line above the solid one?

(c) What is the total of the Shop A values?

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Answer key

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Q	Answer	Working
1	**(d) import matplotlib.pyplot as plt**	—
2	**(a) plt.bar()**	—
3	**(d) plt.legend()**	—
4	**(d) 2**	the last bin includes both 35 and 40
5	**(d) Apr**	the largest y value is 76
6	**(c) 7**	7 rows × 1 column of values
7	**(a) draws a black border around each bar**	—
8	**(a) Red**	Red has the largest height, 56
9	**To show data as a picture so that trends, comparisons, patterns and unusual values can be seen and understood quickly.**	—
10	**1**	heights above 37: 49
11	**1**	values from 10 up to but not including 20
12	**ylabel**	plt.ylabel()
13	**25**	the 5th pair of the lists
14	**Bottles**	Bottles has the smallest height, 27
15	**13**	every value lies between 15 and 30, so all 13 are counted
16	**4**	compare each y value with the one before it: 48, 67, 51, 25, 73, 69, 31
17	**import matplotlib.pyplot as plt sub = ['Maths', 'Science', 'English', 'Hindi', 'IP'] marks = [78, 85, 69, 74, 90] plt.bar(sub, marks, color='red') plt.title('Marks in Term 1') plt.xlabel('Subject') plt.ylabel('Marks') plt.show()**	lists (1); bar with colour (1); title and labels (1); show (1)
18	**import matplotlib.pyplot as plt x = ['Mon', 'Tue', 'Wed', 'Thu'] h = [32, 44, 26, 34] plt.bar(x, h, color='blue') plt.title('Students in each club') plt.xlabel('Category') plt.ylabel('Value') plt.savefig('chart.png') plt.show()**	one mark each for the lists, plt.bar, the title and labels, and savefig before show

Q	Answer	Working
19	**(a) 4; (b) 4; (c) 5**	each bin includes its left edge; the last bin includes 80 too
20	**(a) Apr; (b) 4; (c) 386**	(b) the dashed line is Canteen: compare b with a month by month

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