📊 Interactive Quiz: Matplotlib & Probability

Instructions:

- Answer MCQs by writing the option letter.
- For coding questions, write Python code.
- For interpretation questions, explain briefly.

🔹 Section 1: Matplotlib Basics

Q1. Which library is used for creating plots in Python?
A. NumPy
B. Pandas
C. Matplotlib
D. TensorFlow

C

Q2. Which function is used to create a simple line plot?
A. plt.draw()
B. plt.line()
C. plt.plot()
D. plt.graph()

C

Q3. Coding Question:
Write code to plot the following data:

x = [1,2,3,4,5]
y = [2,4,6,8,10]

Add:

- Title: "Simple Line Plot"
- X label: "X values"
- Y label: "Y values"

```
import matplotlib.pyplot as plt

x = [1, 2, 3, 4, 5]
y = [2, 4, 6, 8, 10]

plt.plot(x, y)
plt.title("Simple Line Plot")
plt.xlabel("X values")
plt.ylabel("Y values")

plt.show()
```

Q4. Which function displays the plot?
A. plt.display()
B. plt.show()
C. plt.render()
D. plt.output()

B

◆ Section 2: Types of Charts

Q5. Which chart is best to show frequency distribution?
A. Pie chart
B. Histogram
C. Line chart
D. Scatter plot

B

Q6. Coding Question:
Create a histogram using random exam scores between 0 and 100.

```
import numpy as np
import matplotlib.pyplot as plt
```

```
# generate random exam scores
scores = np.random.randint(0, 101, 100)

plt.hist(scores, bins=10)
plt.title("Histogram of Exam Scores")
plt.xlabel("Score")
plt.ylabel("Number of Students")

plt.show()
```

Q7. Which chart shows relationship between two variables?
A. Scatter plot
B. Pie chart
C. Histogram
D. Bar chart

A

Q8. Coding Question:
Create a scatter plot of:

```
hours_studied = [1,2,3,4,5]
marks = [40,50,65,70,85]
```

```
import matplotlib.pyplot as plt

hours_studied = [1, 2, 3, 4, 5]
marks = [40, 50, 65, 70, 85]

plt.scatter(hours_studied, marks)
plt.title("Hours Studied vs Marks")
plt.xlabel("Hours Studied")
plt.ylabel("Marks")

plt.show()
```

◆ Section 3: Probability Basics 🎲

Q9. Probability value always lies between:
A. −1 and 1
B. 0 and 1

C. 1 and 10
D. 0 and 100

B

Q10. Probability of getting a head when tossing a fair coin:
A. 0
B. 0.25
C. 0.5
D. 1

C

Q11. Coding Question:
Simulate tossing a coin 100 times using NumPy and plot the results using a bar chart.

```python
import numpy as np
import matplotlib.pyplot as plt

# simulate 100 coin tosses (0 = Tail, 1 = Head)
tosses = np.random.randint(0, 2, 100)

# count results
heads = np.sum(tosses == 1)
tails = np.sum(tosses == 0)

results = ["Heads", "Tails"]
counts = [heads, tails]

# bar chart
plt.bar(results, counts)
plt.title("Coin Toss Simulation (100 Tosses)")
plt.xlabel("Outcome")
plt.ylabel("Count")

plt.show()
```

◆ Section 4: Distributions

Q12. Which distribution is used for coin toss outcomes?
A. Normal

B. Binomial
C. Uniform
D. Exponential

B

Q13. Coding Question:
Generate 1000 random numbers from a normal distribution and plot histogram.

```
import numpy as np
import matplotlib.pyplot as plt

# generate 1000 random numbers from normal distribution
data = np.random.normal(0, 1, 1000)  # mean = 0, standard deviation = 1

# plot histogram
plt.hist(data, bins=20)
plt.title("Histogram of Normal Distribution")
plt.xlabel("Values")
plt.ylabel("Frequency")

plt.show()
```

Q14. Interpretation Question:
If a histogram looks bell-shaped, which distribution is it?

Normal Distribution

◆ **Section 5: Real-World Scenario** 📈

A company recorded website visitors per day:

visitors = [120, 135, 150, 160, 180, 200, 210]

Q15. Coding Question:
Create a line chart showing visitor trend.

```
import matplotlib.pyplot as plt

days = ["Mon", "Tue", "Wed", "Thu", "Fri", "Sat", "Sun"]
visitors = [120, 150, 170, 160, 200, 220, 210]
```

```
plt.plot(days, visitors, marker='o')
plt.title("Website Visitor Trend")
plt.xlabel("Day")
plt.ylabel("Number of Visitors")
plt.grid(True)

plt.show()
```

Q16. Interpretation:
If visitor numbers increase steadily, what does it indicate?

A. Declining traffic
B. Stable traffic
C. Growing traffic
D. Random traffic

C

◆ Section 6: Advanced Thinking

Q17. Which plot is best to visualize probability distribution shape?
A. Histogram
B. Line plot
C. Pie chart
D. Bar chart

A