

1. Calculate Probabilities Using a Binomial Distribution

Q1.1. Pavan kumar makes 65% of his free-throw attempts. If he shoots 15 free throws, what is the probability that he makes exactly 10?

```
In [2]: from scipy.stats import binom
        binom.pmf(k=10, n=15, p=0.65)
```

```
Out[2]: 0.2123386834880357
```

Q1.2. Shivam flips a fair coin 6 times. What is the probability that the coin lands on heads 3 times or fewer

```
In [4]: binom.cdf(k=3, n=6, p=0.5)-binom.cdf(k=0, n=6, p=0.5)
```

```
Out[4]: 0.640625
```

Q1.3. It is known that 65% of individuals support a certain law. If 10 individuals are randomly selected, what is the probability that between 3 and 6 of them support the law?

```
In [5]: binom.cdf(k=6, n=10, p=0.65)-binom.cdf(k=3, n=10, p=0.65)
```

```
Out[5]: 0.4601487031476562
```

2. Calculate Probabilities Using a Poisson Distribution

Q2.1. A store sells 4 apples per day on average. What is the probability that they will sell 6 apples on a given day?

```
In [7]: from scipy.stats import poisson
        poisson.pmf(6, 4)
```

```
Out[7]: 0.10419563456702102
```

```
In [ ]: Q2.2. A certain store sells seven footballs per day on average.
        What is the probability that this store sells four or less footballs in a given day?
```

```
In [9]: poisson.cdf(4, 7)-poisson.cdf(0, 7)
```

```
Out[9]: 0.17207972591651693
```

```
In [ ]: Q2.3. A certain store sells 15 cans of tuna per day on average.
        What is the probability that this store sells more than 20 cans of tuna in a given day?
```

```
In [10]: 1-poission.cdf(20, 15)
```

```
Out[10]: 0.08297091003146029
```

3. Calculate Probabilities Using a Uniform Distribution

Q3.1. Suppose a bus shows up at a bus stop every 20 minutes. If you arrive at the bus stop, what is the probability that the bus will show up in 8 minutes or less?

```
In [11]: from scipy.stats import uniform
        uniform.cdf(x=8, loc=0, scale=20)-uniform.cdf(x=0, loc=0, scale=20)
```

```
Out[11]: 0.4
```

Q3.2. The weight of a certain species of frog is uniformly distributed between 15 and 25 grams. If you randomly select a frog, what is the probability that the frog weighs between 17 and 19 grams?

```
In [12]: uniform.cdf(x=19, loc=15, scale=10)-uniform.cdf(x=17, loc=15, scale=10)
```

```
Out[12]: 0.2
```

Q3.3. The length of an NBA game is uniformly distributed between 120 and 170 minutes. What is the probability that a randomly selected NBA game lasts more than 150 minutes?

```
In [13]: 1-uniform.cdf(x=150, loc=120, scale=50)
```

```
Out[13]: 0.4
```

4. Calculate Probabilities Using a Normal Distribution

Q4.1. A radar unit is used to measure speeds of cars on a motorway. The speeds are normally distributed with a mean of 90 km/hr and a standard deviation of 10 km/hr. What is the probability that a car picked at random is travelling at more than 100 km/hr?

```
In [14]: from scipy.stats import norm
        1-norm.cdf(100, 90, 10)
```

```
Out[14]: 0.15865525393145707
```

Q4.2. For a certain type of computers, the length of time between charges of the battery is normally distributed with a mean of 50 hours and a standard deviation of 15 hours. John owns one of these computers and wants to know the probability that the length of time will be between 50 and 70 hours.

```
In [15]: norm.cdf(70, 50, 15)-norm.cdf(50, 50, 15)
```

```
Out[15]: 0.4087887802741321
```

Q4.3. Entry to a certain University is determined by a national test. The scores on this test are normally distributed with a mean of 500 and a standard deviation of 100. Tom wants to be admitted to this university and he knows that he must score better than at least 70% of the students who took the test. Tom takes the test and scores 585. Will he be admitted to this university?

```
In [19]: if 1-norm.cdf(585, 500, 100)<1*0.3:
        print("He will be admitted to this university")
```

He will be admitted to this university

```
In [ ]:
```