

Gayathri R

In [ ]: WEEK-2: Assignment - Probability Distribution

1.Calculate Probabilities Using a Binomial Distribution

In [ ]: 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 [1]: from scipy.stats import binom  
binom.pmf(k=10,n=15,p=0.65)

Out[1]: 0.2123386834880357

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

In [2]: binom.cdf(k=3,n=6,p=0.5)-binom.cdf(k=0,n=6,p=0.5)

Out[2]: 0.640625

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

Out[6]: 0.4601487031476562

2.Calculate Probabilities Using a Poisson Distribution

In [ ]: 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 [8]: poisson.cdf(4,7)-poisson.cdf(0,7)

Out[8]: 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 [9]: 1-poisson.cdf(20,15)

Out[9]: 0.08297091003146029

3.Calculate Probabilities Using a Uniform Distribution

In [ ]: 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 [10]: from scipy.stats import uniform  
uniform.cdf(x=8,loc=0,scale=20)-uniform.cdf(x=0,loc=0,scale=20)

Out[10]: 0.4

In [ ]: 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 [11]: uniform.cdf(x=19,loc=15,scale=10)-uniform.cdf(x=17,loc=15,scale=10)

Out[11]: 0.2

In [ ]: 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 [12]: 1-uniform.cdf(x=150,loc=120,scale=50)

Out[12]: 0.4

4.Calculate Probabilities Using a Normal Distribution

In [ ]: 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 [13]: from scipy.stats import norm  
1-norm.cdf(100,90,10)

Out[13]: 0.15865525393145707

In [ ]: Q4.2.For a certain type of computers,  
the length of time bewteen 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 [14]: norm.cdf(70,50,15)-norm.cdf(50,50,15)

Out[14]: 0.4087887802741321

In [ ]: 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 [16]: if 1-norm.cdf(585,500,100)<1\*0.3:  
print("He will admitted to this university")

He will admitted to this university

In [ ]: