1. Consider the Bernoulli distribution with p=0.8 If a sequence of 10 trials are done, what is the expected value of the number of successes that occur?

Concept: Bernoulli Distribution

P(Success) = 0.8

P(Failure) = 1-0.8 = 0.2

Expected value (mean) = failure \* 0 + success \* 1

= 0.2\*0 + 0.8\*1

Similar 10 trials are done = (10\*0.8)

= **8**

Expected value of success that occur is **8**.

1. A company makes electronic components for TV's. 95% pass final inspection (and 5% fail and need to be fixed). 120 components are inspected in one day. What is the expected number that fail in one day?

Concept: Bernoulli as it is about fail and success; finite trails.

Let X = no. of defective component in 120 sample.

X is binomial since 120 trials finite, success/fail.

P(defective) = 0.05

Mean of X = n \* p

= 120\* 0.05

= 6

The expected number of components that fail in one day is **6**.

1. The ages of the population of a town are Normally distributed with mean 43 and standard deviation 14. The town has a population of 5,000. How many would you expect to be aged between 22 and 57?

Concept: - Normal Distribution follows 68-95-99.7 rule in which,

68% is 2 std deviation away from mean.

95% is 4 SD away from mean.

99.7% is 6 SD away from mean.

2 tails at left and right is 0.3% (each 0.15) SD away from mean.

Given, Mean = 43, SD = 14

So, the Interval around 1SD is (43-14, 43+14) = (29,57)

The Interval around 2SD is (43-14-14, 43+14+14) = (15, 71)

Here we need between (22,57) which is the interval around 1SD from mean. According to the empirical rule. That interval contains less than **68%** of the data.

1. A lens outlet owner buys his glass from four different manufacturers -Clearglass(10%), Strongpane(25%), Mirrorglass(30%) and Reflection (35%). In the past, the outlet owner has found that 1% of Clearglass' product is cracked, 1.5% of Strongpane's product is cracked, and 2% of Mirrorglass' and Reflection's products are cracked. He removes the protective covering from a sheet of glass without looking at the manufacturer's name -in other words, it's a random choice. He finds the glass is cracked. What is the probability it was made by Mirrorglass?

Concept: Conditional Probability

P(c) = .10

P(S) = .25

P(M) = .30

P(R) = .35

P(defected C) = .01, P(non defected C) = .10-.01 = 0.09

P(defected S) = .015, P(non defected S) = .25-.015 = 0.235

P(non defected m or R) = P(non defected C)+ P(non defected S) = 0.325

P(defected m or R) = 1-0.325 =0.675

P (defected m and R) = .02

P(defected M) =?

P (m or R) = P(m) + P® - P(m and R) => 0.675 = X + .35-.02 = **0.345**

1. In a group of 25 boys, 20 play ice hockey and 17 play baseball. They all play at least one of the games. What is the probability that a boy chosen at random from the class plays ice hockey but not baseball?

P(H) = 20/25

P(B) = 17/25

P(not B) = 1-17/25

P(H|not B) = P(H) \* P(not B)

= 20/25 \* (1-17/25)

= 0.8\* 0.32

= 0.256

So, the probability of playing hockey but no baseball is **0.256**

1. In a class of 35 children, 22 like bananas, 18 like cherries and 13 like strawberries. 7 of them like bananas and cherries. 8 of them like bananas and strawberries. 5 of them like cherries and strawberries. They all like at least one of the fruits. What is the probability that a child chosen at random from the class likes cherries only?

Venn Diagram Problem:

N = 35

B = 22

C = 18

S = 13

B and C = 7

B and S = 8

C and S = 5

P(Cherries only) = ?

**N(B or C or S)= n(B)+n(C)+n(S)-n(B and C) -n(C and S) -n(B and S)-n(B and C and S)**

Therefore, 35 = 22+18+13-7-5-8 +X

On solving, X= 2

No of Children liking only Cherries: 18- (5+2+3) = 8

P(only cherries ) = 8/35 = **0.228**

1. Two fair dice are thrown. What is the probability that the score on the first die is 6 or the score on the second die is 5?

P(not getting 6) = 5/6

P(not getting 5) = 5/6

Independent events so apply product rule.

P(not getting 6 or 5) = 5/6\*5/6 = 25/36

P(getting 6 or 5) = 1-25/36 = 11/36

Final Answer: **11/36**