NAME : ABHAY SINGH KHANKA

STUDENT NUMBER : 18309999

Q1 We have Y as the sum of the values rolled

1. For Y = 2, sum of the values rolled on the dice must be equal to two

Only one combination is possible for this, i.e. { (1,1) }

1. Similarly for Y = 3, we have

{ (1,2), (2,1) }

1. For Y = 4, we have

{ (2,2), (1,3), (3,1) }

1. For X = 1, where X is an indicator random variable, which would mean that the event X is associated is true

And we have our sample space = 36

Therefore the probability of that event = 3/36 = 0.083

Q2 Assuming X = Num. of heads – Num. of Tails

1. Here X is related to the sample space of tossing 3 coins

Thus, the values of X are -3, 3, -1, 1

1. P(X=-3) is the probability of getting 3 tails = 1/8
2. P(X=-1) is the probability of getting 1 head and 2 tails = 3/8
3. PMF of X

|  |  |
| --- | --- |
| X | P(X) |
| -3 (3 tails) | 1/8 |
| -1 (1 head and 2 tails) | 3/8 |
| 1 (2 heads and 1 tail) | 3/8 |
| 3 (3 heads) | 1/8 |

CDF of X

F(-3) = P(X <= -3) = P(3 tails) = 1/8

F(-1) = P(X <= -1) = P(1 head and 2 tails) = 3/8

F(1) = P(X <= 1) = P(2 heads and 1 tail) = 3/8

F(3) = P(X <= 3) = P(3 heads) = 1/8

F(x) = { 0 -4 < x < 4

1/8 x = -3, x = 3

3/8 x = -1, x = 1

}

Q3

1. Here X is the minimum of the four values rolled

P(X>=1) is the probability of at least a number 1 or more being rolled, which is always true

Thus P(X>=1) = 1

1. P(X>=2) is the probability of at least a number 2 or more being rolled

P(X>=2) = (5^4) / (6^4) = 0.48

1. For any x<1, F(x) = P(X = x) = 0

For 1<= x < 2, F(x) = P(X =x) = 0.16

For 2<= x < 3, F(x) = P(X =x) = 0.33

For 3<= x < 4, F(x) = P(X =x) = 0.50

For 4<= x < 5, F(x) = P(X =x) = 0.66

For 5<= x < 6, F(x) = P(X =x) = 0.83

For 6<= x < 7, F(x) = P(X =x) = 1

For x>6, F(x) = 0

CDF of X

F(x) = { 0 x < 1, x > 6

0.16 1 <= x < 2

0.33 2 <= x < 3

0.50 3 <= x < 4

0.66 4 <= x < 5

0.83 5 <= x < 6

1 6 <= x

}