

Student Information

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Answer 1

a)

$$E(\text{Blue}) = \frac{1}{6} (1 + 2 + 3 + 4 + 5 + 6) = \frac{7}{2}$$

$$E(\text{Yellow}) = 1 * \frac{3}{8} + 3 * \frac{3}{8} + 4 * \frac{1}{8} + 8 * \frac{1}{8} = 3$$

$$E(\text{Red}) = 2 * \frac{5}{10} + 3 * \frac{2}{10} + 4 * \frac{2}{10} + 6 * \frac{1}{10} = 3$$

b)

0.0.1 i)

Sum up Expected value of each of dice. $E(\text{Blue}) + E(\text{Yellow}) + E(\text{Red}) = 3.5 + 3 + 3 = 9.5$

0.0.2 i)

Add up Expected Value of Blue 3 times. $3 * E(\text{Blue}) = 10.5$

So, by comparing cases i and ii, total expected value at ii is greater $10.5 > 9.5$. therefore, answer is rolling 3 Blue dices.

c)

In this question we apply the same logic with summing up the expected values of the dices given that $E(\text{Yellow}) = 8$. So, the total expected value for i case in b part will be $E(\text{Blue}) + E(\text{Yellow}) + E(\text{Red}) = 3.5 + 8 + 3 = 14.5$

In this case, maximum total value will be obtained in the case of rolling three different dices, instead of three Blue dices because $14.5 > 10.5$

d)

Here Bayes Rule must be applied since we are working with conditional probability. $P(\text{Red} | \text{Value} = 3) =$

$$\frac{P(\text{Value}=3|\text{Red})P(\text{Red})}{P(\text{Value}=3)} = \frac{\frac{1}{5} * \frac{1}{3}}{\frac{1}{6} * \frac{1}{3} + \frac{3}{8} * \frac{1}{3} + \frac{1}{5} * \frac{1}{3}} = \frac{24}{55}$$

e)

Possible outcomes

Blue	Yellow
1	4
2	3
	3
	3
4	1
	1
	1

So the number of favourable outcomes is 7. There are total possible $6 \times 8 = 48$ outcomes.

Answer is $\frac{7}{48}$

Answer 2

a)

Using Binomial distribution

$n=80$

$p=0.025$

$q=1-0.025=0.975$

$x=4$

$P(X \geq 4) = 1 - P(X \leq 3) =$

$$1 - \left(\binom{80}{0} * 0.025^0 * 0.975^{80} + \binom{80}{1} * 0.025^1 * 0.975^{79} + \binom{80}{2} * 0.025^2 * 0.975^{78} + \binom{80}{3} * 0.025^3 * 0.975^{77} \right) \\ = 0.14057$$

b)

A= no discount in all 80 shops of company A in either of 2 days

B= no discount in 1 shop of company B in either of 2 days

$$P(A) = (1 - 0.025)^2 * 80 = 0.0973$$

$$P(B) = (1 - 0.01)^2 = 0.81$$

$$P(\text{not } A) = 1 - 0.0973 = 0.902$$

$$P(\text{not } B) = 1 - 0.81 = 0.19$$

$$P(A \text{ union } B) = 0.902 + 0.19 - (0.902 * 0.19)$$

Answer 3

blue = [1 2 3 4 5 6];

yellow = [1 1 1 3 3 3 4 8];

red = [2 2 2 2 2 3 3 4 4 6];

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opt1_total = 0;
opt2_total = 0;
greater_count = 0;

for i = 1:1000
    opt1_roll = [blue(randi(length(blue))), yellow(randi(length(yellow))), red(randi(length(red)))];
    opt1_total = opt1_total + sum(opt1_roll);

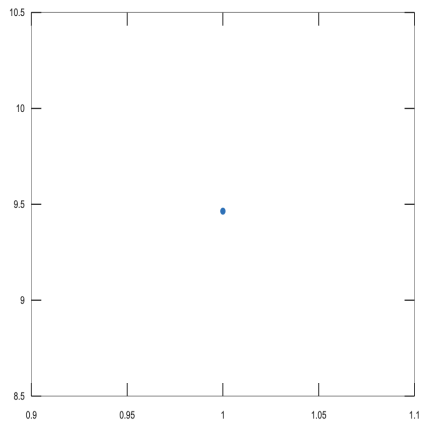
    opt2_roll = [blue(randi(length(blue))), blue(randi(length(blue))), blue(randi(length(blue)))];
    opt2_total = opt2_total + sum(opt2_roll);

    if sum(opt2_roll) > sum(opt1_roll)
        greater_count = greater_count + 1;
    end
end

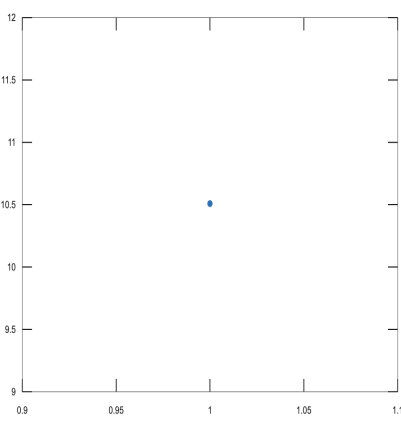
opt1_average_total = opt1_total / 1000;
opt2_average_total = opt2_total / 1000;
greater_percentage = greater_count / 10;
plot(opt1_average_total);
plot(opt2_average_total);
plot(greater_percentage);

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plot(opt1_average_total);



plot(opt2_average_total);



plot(greater_percentage);

