Student Information

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Answer 1

a)

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

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

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

b)

0.0.1 i)

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

0.0.2 i)

Add up Expected Value of Blue 3 times. 3*E $(Blue)$= 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 $(Yellow)$=8. So, the total expected value for i case in b part will be E $(Blue)$+ E $(Yellow)$ + E (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. $P(Red|Value = 3) = \frac{P(Value=3|Red)P(Red)}{P(Value=3)} = \frac{\frac{1}{5}*\frac{1}{3}}{\frac{1}{6}*\frac{1}{3}+\frac{3}{8}*\frac{1}{3}+\frac{1}{5}*\frac{1}{3}} = \frac{24}{55}$

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*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(not A)=1-0.0973=0.902
P(not B)=1-0.81=0.19
P(A 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))), re
    opt1_total = opt1_total + sum(opt1_roll);

    opt2_roll = [blue(randi(length(blue))), blue(randi(length(blue))), blue(r
    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);
```