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Question 5 - 7

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You decide to move out of your college's dorms and get an apartment, and you want to discuss the budget with your roommate. You know that your monthly grocery bill G will depend on a number of factors, such as whether you are too busy to cook, whether you invite guests for meals frequently, how many special holiday meals you will cook, etc. In particular, G will have an approximate normal distribution with a variance of 2500 and a mean:

$$\mu = 300 + 10M - 100B + 50H$$

Where M is the number of meals to which you invite guests, and $\mathbb{E}[M] = 8$. B is a measure for how busy you are with 14.310X problem sets---assume it is $U[0, 1]$. H is a variable that takes on the value 1 for holiday months of November, December, and January and 0 otherwise.

Question 5
1/1 point (graded)
What is the mean of G in a November, where $M = 10$ and $B = 0.5$?

| 400 | ✔ **Answer:** 400

400

Explanation

We have that:

$$\mathbb{E}\left[G|M, B, H = 1\right] = 300 + 10 * 10 - 100 * 0.5 + 50$$

$$\mathbb{E}\left[G|M, B, H = 1\right] = 300 + 100 - 50 + 50 = 400$$

Submit   You have used 2 of 2 attempts

✔ Correct (1/1 point)

Question 6

1 point possible (graded)

For a month chosen at random what is $\mathbb{E}\left[G|M, B\right]$? (Select all that apply)

☐ a. It is given by $\mathbb{E}\left[300 + 10M - 100B + 50\right]$

☐ b. It is given by $\mathbb{E}\left[300 + 10M - 100B\right]$

☑ c. It is given by $300 + 10\mathbb{E}[M] - 100\mathbb{E}[B] + 50 * \mathbb{E}\left[H\right]$ ✔

☑   d. It is given by $312.5 + 10\mathbb{E}[M] - 100\mathbb{E}[B]$ ✔

☐   e. It is given by $\mathbb{E}\left[300 + 10M - 100B + 50 * \frac{3}{4}\right]$

☑   f. It is given by $\mathbb{E}\left[300 + 10M - 100B + 50 * \frac{1}{4}\right]$ ✔

✖

Explanation
We have that

$$\mathbb{E}[G|M, B] = \mathbb{E}[300 + 10M - 100B + 50H]$$

$$\mathbb{E}[G|M, B] = 300 + 10\mathbb{E}[M] - 100\mathbb{E}[B] + 50 * \mathbb{E}[H]$$

$$\mathbb{E}[G|M, B] = 300 + 10\mathbb{E}[M] - 100\mathbb{E}[B] + 50 * \frac{1}{4}$$

$$\mathbb{E}[G|M, B] = 312.5 + 10\mathbb{E}[M] - 100\mathbb{E}[B]$$

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✖   Incorrect (0/1 point)

Question 7

1/1 point (graded)

What is $E(G)$?

342.5

✔ **Answer:** 342.5

Explanation

We have that:

$$\mathbb{E} \left[G \mid M,B \right]=312.5 +10 \mathbb{E} [M] -100 \mathbb{E} [B]$$

$$\mathbb{E} \left[G \mid M,B \right]=312.5 +10 *8 -100*0.5$$

$$\mathbb{E} \left[G \mid M,B \right]=312.5 +80 -50$$

$$\mathbb{E} \left[G \mid M,B \right]=342.5$$

Submit   You have used 2 of 2 attempts

✔   Correct (1/1 point)