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Practice quiz on Problem Solving

8/9 points earned (88%)

Excellent!

Retake

Next

✔ 1 / 1 points

1.

I am given the following 3 joint probabilities:

p(I am leaving work early, there is a football game that I want to watch this afternoon) = $.1$

p(I am leaving work early, there is not a football game that I want to watch this afternoon) = $.05$

p(I am not leaving work early, there is not a football game that I want to watch this afternoon) = $.65$

What is the probability that there is a football game that I want to watch this afternoon?

- .2
- .35
- .1
- .3

Correct

Getting the answer is a two-step process. First, recall that the sum of probabilities for a probability distribution must sum to 1. So the “missing” joint distribution

p(I am not leaving work early, there is a football game I want to watch this afternoon) must be
$1 – (0.1 + 0.05 + 0.65) = 0.2$

By the sum rule, the marginal probability p(there is a football game that I want to watch this afternoon) = the sum of the joint probabilities

P(I am leaving work early, there is a football game that I want to watch this afternoon) + P(I am not leaving work early, there is a football game I want to watch this afternoon) = $.1 + .2 = .3$

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1 / 1 points

2.
The Joint probability of my summiting Mt. Baker in the next two years AND publishing a best-selling book in the next two years is $.05$. If the probability of my publishing a best-selling book in the next two years is 10%, and the probability of my summiting Mt. Baker in the next two years is 30%, are these two events dependent or independent?

- Independent
- Dependent

Correct
We know this because the joint distribution of 5% does not equal the product distribution of $(0.1) \times (0.3) = 3\%$. If I summit Mt. Baker, I am more likely to publish a best-selling book, and vice versa.

1 / 1
points

3.
The Joint probability of my summiting Mt. Baker in the next two years AND my publishing a best-selling book in the next two years is $.05$.

If the probability of my publishing a best-selling book in the next two years is 10%, and the probability of my summiting Mt. Baker in the next two years is 30%, what is the probability that (sadly) in the next two years I will neither summit Mt. Baker nor publish a best-selling book?

- .25
- .95
- .9
- .65

Correct
Set A = I will summit Mt. Baker in the next two years

Set B = I will publish a best-selling book in the next two years.

Since $p(A) = 0.3 \text{ and } p(A, B) = 0.05$, by the SUM RULE we know that $p(A, \sim B) = (0.3 - 0.05) = 0.25$

Since $p(B) = 0.1$,$p(\sim B) = 0.9$

Since $p(\sim B) = 0.9$ and $p(A, \sim B) = 0.25$ and again by the SUM RULE,
$p(\sim A, \sim B) = 0.9 - 0.25 = .65$

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0 / 1 points

4.
I have two coins. One is fair, and has a probability of coming up heads of .5. The second is bent, and has a probability of coming up heads of $.75$. If I toss each coin once, what is the probability that at least one of the coins will come up heads?

- .625

This should not be selected
We apply the rule $p(A$ or $B) = p(A) + p(B)$ - $p(A, B)$

Because the events are independent,
$p(A, B) = p(A)p(B)$

$p(A$ or $B) = .5 + .75 - .375 = 0.875.$

- .375
- 1.0
-

.875

1 / 1
points

5.
What is $\frac{11!}{9!}$?

- $110,000$
- 110

Correct
$$\frac{11!}{9!} = 11 \times 10 = 110$$

- $4,435,200$
- $554,400$

1 / 1
points

6.
What is the probability that, in six throws of a die, there will be exactly one each of "1" "2" "3" "4" "5" and "6" ?

- .01432110
- .01176210

.00187220

.01543210

Correct

There are $6! = 720$ permutations where each face occurs exactly once.

There are $6 \times 6 \times 6 \times 6 \times 6 \times 6 = 46656$ total permutations of 6 throws.

The probability is therefore

$$\frac{720}{46656} = 0.01543210$$

1 / 1 points

7.

On 1 day in 1000, there is a fire and the fire alarm rings.

On 1 day in 100, there is no fire and the fire alarm rings (false alarm)

On 1 day in $10,000$, there is a fire and the fire alarm does not ring (defective alarm).

On $9,889$ days out of $10,000$, there is no fire and the fire alarm does not ring.

If the fire alarm rings, what is the (conditional) probability that there is a fire?

Written $p(\text{there is a fire} \mid \text{fire alarm rings})$

- 1.12%
- 90.9%
- 1.1%
- 9.09%

Correct

10 days out of every $10,000$ there is fire and the fire alarm rings.

100 days out of every $10,000$ there is no fire and the fire alarm rings.

110 days out of every $10,000$ the fire alarm rings.

The probability that there is a fire, given that the fire alarm rings, is $\frac{10}{110} = 9.09\%$

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1 / 1 points

8.
On 1 day in 1000, there is a fire and the fire alarm rings.

On 1 day in 100, there is no fire and the fire alarm rings (false alarm)

On 1 day in $10,000$, there is a fire and the fire alarm does not ring (defective alarm).

On $9,889$ days out of $10,000$, there is no fire and the fire alarm does not ring.

If the fire alarm does not ring, what is the (conditional) probability that there is a fire?

p(there is a fire | fire alarm does not ring)

- 1.0001%

- $.10011\%$
- 0.01011%

Correct

On $(1 + 9,889)$ = $9,890$ days out of every $10,000$ the fire alarm does not ring.

On 1 of those $10,000$ days there is a fire.

$$\frac{1}{9890} = 0.01011\%$$

- $.01000\%$

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1 / 1 points

9.

A group of 45 civil servants at the State Department are newly qualified to serve as Ambassadors to foreign governments. There are 22 countries that currently need Ambassadors. How many distinct groups of 22 people can the President promote to fill these jobs?

- =2.429*(10^-13
- =1.06*(10^35)
- $4.1167 \times (10^12)$

Correct

$$\binom{45}{22}$$

$$= 45!/(23!)(22!)$$

$$= \frac{45!}{23! \times 22!}$$

- $8.2334 \times (10^1 2)$