Congratulations! You passed!

TO PASS 75% or higher

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GRADE
77.77%

Practice quiz on Problem Solving

TOTAL POINTS 9

1. I am given the following 3 joint probabilities: 1 / 1 point

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
- .1
- (selected) .3
- .35

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) = $.1 + .2 = .3$

2. The 1 / 1 point
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?

- (selected) Dependent
- Independent

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.

3. The 1 / 1 point
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?

- .95
- .9
- (selected) .65

○ .25

✓ **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 $p(A) = 0.3$ 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, $p(\sim A, \sim B) = 0.9 - 0.25 = .65$

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?

0 / 1 point

○ 1.0

◉ .375

○ .625

○ .875

! **Incorrect**

We apply the rule p(A or B or both)

= 1 - (p(~A)p(~B))

= 1 - ((1- .5)(1-.75))

= 1 - .125

=.875

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

1 / 1 point

○ $554,400$

○ $4,435,200$

○ $110,000$

◉ 110

✓ **Correct**

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

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" ?

0 / 1 point

○ .00187220

○ .01543210

◉ .01432110

○ .01176210

! **Incorrect**

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

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

1 / 1 point

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

- ○ 90.9%
- ○ 1.1%
- ○ 1.12%
- ◉ 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 $\frac{10}{110} = 9.09\%$

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

1 / 1 point

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%
- ○ $.01000\%$
- ◉ 0.01011%
- ○ $.10011\%$

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.

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

9. A group of 45 civil servants at the State Department are newly qualified to serve as Ambassadors to foreign governments. There are 22

1 / 1 point

countries that currently need Ambassadors. How many distinct groups of 22 people can the President promote to fill these jobs?

- ○ =1.06*(10^35)
- ○ 8.2334 \times (10^12)
- ◉ $$4.1167 \times (10^12)
- ○ =2.429*(10^-13)

✓ Correct

$\binom{45}{22}$

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

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