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Question 1

Correct

Marked out of 1.00

Let A and B be arbitrary events. Match the following events with their definitions.

$(A \cap B^c) \cup (A^c \cap B)$ Event C that only A or only B occur ✓

$C = A \cup B$ At least one of the two events (A or B) happens. ✓

$(A \cup B)^c \cup (A \cap B^c)$ Anything except items in B may happen. ✓

Question 2

Correct

Marked out of 1.00

Two voters, Al and Bill, are each choosing between one of three candidates-1, 2, and 3-who are running for city council. An experimental outcome specifies both Al's choice and Bill's choice, e.g., the pair (3,2), which says that Al chooses candidate 3 and Bill chooses candidate 2.

The sample space S of this experiment is $\{(1,1),(1,2),(1,3), (2,1),(2,2),(2,3), (3,1), (3,2),(3,3)\}$ ✓

The event that Al and Bill make the same choice is $\{(1,1),(2,2),(3,3)\}$ ✓

The event that neither of them votes for candidate 2 is $\{(1,1),(1,3),(3,1),(3,3)\}$ ✓

Question 3

Correct

Marked out of 1.00

In the roll of two fair six-sided dice, let

$E = \{\text{"the sum is odd"}\}$

$F = \{\text{"at least one of the dice land in 1"}\}$

The elements of the event

$$E \cap F$$

are

Select one:

☐ a.

$\{(1,2), (1,4), (1,6)\}$

☒ b.

$\{(1,2), (2,1), (1,4), (4,1), (1,6), (6,1)\}$



☐ c.

$\{(1,1), (1,2), (2,1), (1,3), (3,1), (1,4), (4,1), (4,1), (1,5), (5,1), (1,6), (6,1)\}$

☐ d.

$\{(1,1), , (2,1), (1,3), (1,4), (4,1), (1,5), (1,6)\}$

Question 4

Correct

Marked out of 1.00

Consider an experiment in which each of three vehicles taking a particular freeway exit turns left (L) or right (R) at the end of the off-ramp. Consider the event

$B = \{\text{one of the vehicles turns right}\}$

The number of outcomes of B is

Select one:

☒ a. 3

☐ b. 1

☐ c. 5

☐ d. 8



Question 5

Correct

Marked out of 1.00

Weighing yourself every day is

Select one:

- ☒ a. a random experiment
- ☐ b. A sample space
- ☐ c. An event
- ☐ d. a probability



Question 6

Correct

Marked out of 1.00

According to the pre-recorded lecture "What is probability for?" in the Getting Ready module, probability is for (select all that applies).

- ☒ a. Making decisions
- ☒ b. Explaining situations that would otherwise be hard to explain
- ☒ c. exploiting randomness
- ☒ d. narrative



Question 7

Correct

Marked out of 1.00

This question can be solved using the methodology taught in the pre-recorded learning glass video on partitions (2). Use the technique there and you will get the right answer.

A tract of land in the Alabama Piedmont contains a number of dead shortleaf pine trees, some of which had been killed by the littleleaf disease, some by the southern pine beetle, and some by fire. Suppose that out of 500 trees,

70 have (were killed) by littleleaf disease alone
50 have (were killed) by Southernpine beetle alone
10 were killed by fire alone
100 were killed littleleaf disease and southern pine beetle
160 were killed by littleleaf disease and fire
90 were killed by pine beetle and fire
20 were killed by all three factors

if I draw a dead tree at random, what is the probability that the tree was killed by littleleaf disease? Draw for yourself a Venn diagram to illustrate your answer, like we did in the Partitions lecture, part 2.

(Johnson, 2000)

Notice: The fact that there are 500 trees and that all those numbers listed is 500 is a coincidence.

- ☒ a. 62%
- ☐ b. 25%
- ☐ c. 10%
- ☐ d. 5%



Question 8

Correct

Marked out of 1.00

If you review the pre-recorded lecture "Building blocks of modern probability. Par 1" this problem will be easier. There is a similar example there.

Four components are connected to form a system as shown in Figure 2.8 in the textbook. The subsystem 1-2 will function if both of the individual components functions. The subsystem 3-4 functions if both of the individual 3-4 components functions. For the entire system to function, at least one of the two subsystems must function. We conduct an experiment that consists of observing the status of each and every component of this system.

Let A be the event that the system does not work. How many outcomes of the sample space are there in this event?

- ☒ a. 9
- ☐ b. 7
- ☐ c. 5
- ☐ d. 10



Question 9

Correct

Marked out of 1.00

It is possible to derive formulas for the number of elements in a set which is the union of more than two sets, but usually it is easier to work with Venn diagrams. For example, suppose that the Data Science club reports the following information about 30 of its members: 19 work part time, 17 take stats, 11 volunteer on Volunteer day, 12 work part time and take stats, 7 volunteer and work part time, 5 take stats and volunteer and 2 volunteer, take stats and work part time. If I draw a student at random, what is the probability that the student does not work part time and does not take stats and does not volunteer on Volunteer day?

- ☒ a. 0.167
- ☐ b. 0.75
- ☐ c. 0.15
- ☐ d. 0.99



Question 10

Correct

Marked out of 1.00

The partition of S done in the example covered in the pre-recorded lecture "Partitions, part 2" has how many subsets of S?

- ☒ a. 8
- ☐ b. 10
- ☐ c. 5
- ☐ d. 7





Question 11

Correct

Marked out of 1.00

(Based on Khilyuk, Chilingar, and Rieke 2005, page 37). A protect-the-bay program is trying to prevent eutrophication (excessive nutrient enrichment that produces an increasing biomass of phytoplankton and causes significant impact on water quality and marine life). To measure biologic water quality the protect-the-bay program uses mean chlorophyll concentration on the surface, mean chlorophyll concentration on the photic layer, and mean chlorophyll concentration of the water column. If each of these are ranked as high or normal, the number of possible outcomes in the sample space of biological water quality is the same as the number of outcomes in which of the following experiments described in pre-recorded lecture "Building blocks of modern probability"? Select all that applies.


- ☒ a. Capoeira example 
- ☐ b. Nilometer experiment
- ☐ c. Fringehead experiment
- ☒ d. tossing three coins 
- ☐ e. screening people entering the mobile clinic to see if they are O blood

Question 12

Correct

Marked out of 1.00

You will recognize the following problem as similar to one in the pre-recorded lecture "Origins of the Mathematical theory of probability. If we roll two fair 4-sided die, and I have to bet on a sum of 4 or 5, which of the following is true?

- ☐ a. 4 has higher chance of happening than 5.
- ☒ b. 5 has higher chance of happening than 4. 
- ☐ c. 4 and 5 have equal chance of happening.
- ☐ d. It can not be determined with the information given


Question 13

Correct

Marked out of 1.00

If you went over the pre-recorded lecture "Origins of the Mathematical Theory of probability", you will recognize that the following exercise is very similar to one posed there. If you attended the TA session or went over what was done there, you will be familiar with how that problem was approached, if you did not understand it during the lecture.

A student has just transferred to a public university and requires the choice of both an applied course and a theoretical course. There are three departments on campus that the student likes, each offering 6 theoretical courses that the student could take and 3 applied courses that the student could take. The student has been told in orientation that it must select both the theoretical and the applied course from the same department. In how many ways can this be done?

- ☐ a. 20
- ☐ b. 24
- ☒ c. 54 
- ☐ d. 121

Question 14

Correct

Marked out of 1.00

Which of the following properties must a partition of an event A have, as discussed in the pre-recorded lectures on partitions in Module 1? Select all that applies.

- ☒ a. The empty set can not be a member of a partition
- ☒ b. The sets that make the partition must be mutually exclusive
- ☒ c. The union of all the events forming the partition equals the event A
- ☐ d. The empty set is a member of the partition



Question 15

Correct

Marked out of 1.00

Consider two events, A and B, in a sample space. The event

$$(A \cap B^c) \cup (B \cap A^c)$$

represents the events

Select one:

- ☒ a. only A or only B happens, but not both
- ☐ b. A and B happen
- ☐ c. Neither A nor B happens
- ☐ d. A or B happens



Question **16**

Correct

Marked out of 1.00

Two six-sided dice are rolled. Let A be the event that the sum is less than nine, and let B be the event that the first number rolled is five. Events A and B are

Select one or more:

- ☐ a. mutually exclusive
- ☐ b. complements of each other
- ☐ c. equal
- ☒ d. not mutually exclusive
- ☐ e. independent

