

<b>Started on</b>	Tuesday, 30 November 2021, 11:30 PM
<b>State</b>	Finished
<b>Completed on</b>	Wednesday, 1 December 2021, 12:12 AM
<b>Time taken</b>	42 mins 23 secs
<b>Marks</b>	22.50/25.00
<b>Grade</b>	9.00 out of 10.00 (90%)

Question **1**

Correct

Mark 1.00 out of 1.00

Computer keyboard failures are due to faulty electrical connects (12%) or mechanical defects (88%). Mechanical defects are related to loose keys (27%) or improper assembly (73%).

Find the probability that a failure is due to loose keys. Round to 2 decimal places.

- ☒ a. 0.24
- ☐ b. 0.64
- ☐ c. 0.03
- ☐ d. 0.09



Your answer is correct.

$0.27 \times 0.88$

The correct answer is:

0.24

Question 2

Partially correct

Mark 0.50 out of 1.00

$$P(A \cap B) = P(A) \cdot P(B)$$

The events  $A$  and  $B$  are not independent if

- ☒ a.  $P(A) = 0.2$ ,  $P(B) = 0.2$  and  $A$  and  $B$  are mutually exclusive
- ☐ b.  $P(A | B) = 0.3$ ,  $P(A) = 0.3$  and  $P(B) = 0.8$
- ☐ c. All the others
- ☐ d.  $P(A | B) = 0.4$ ,  $P(A) = 0.5$  and  $P(B) = 0.8$

$$P(A \cap B) = 0$$



The correct answers are:  $P(A | B) = 0.4$ ,  $P(A) = 0.5$  and  $P(B) = 0.8$ ,  $P(A) = 0.2$ ,  $P(B) = 0.2$  and  $A$  and  $B$  are mutually exclusive

Question **3**

Correct

Mark 1.00 out of 1.00

A large retail company gives an employment screening test to all prospective employees. Frankin Gilman recently took the test and it was reported back to him that his score placed him at the 80th percentile. Therefore:

- ☒ a. Frankin scored as high or higher than 80 percent of the people who took the test
- ☐ b. Frankin was in the bottom 20 percent of those that have taken the test
- ☐ c. None of the other choices is correct
- ☐ d. 80 people who took the test scored below Franklin



Your answer is correct.

The correct answer is:

Frankin scored as high or higher than 80 percent of the people who took the test

Question **4**

Correct

Mark 1.00 out of 1.00

Which of the following cannot be a probability?

☒ a. 4/3

☐ b. 1

☐ c. 86%

☐ d. 0.4



The correct answer is: 4/3

Question 5

Correct

Mark 1.00 out of 1.00

A school survey found that 7 out of 30 students walk to school. If four students are selected at random without replacement, what is the probability that all four walk to school?

- ☐ a. None of others
- ☐ b. 343/93690
- ☐ c. 7/6750
- ☒ d. 1/783

$$\frac{7C4}{30C4}$$



The correct answer is: 1/783

Question 6

Correct

Mark 1.00 out of 1.00

Compute  $P(A \cup B)$  if  $P(A) = 1/3$ ,  $P(B) = 1/2$  and  $P(B | A) = 1/4$ .

- ☐ a.  $2/3$
- ☐ b. None of these
- ☒ c.  $3/4$
- ☐ d.  $7/12$
- ☐ e.  $1/2$



Your answer is correct.

$$P(A \cap B) = P(A)P(B|A) = \frac{1}{3} \cdot \frac{1}{4} = \frac{1}{12}$$

$$\begin{aligned} P(A \cup B) &= P(A) + P(B) - P(A \cap B) \\ &= \frac{1}{3} + \frac{1}{2} - \frac{1}{12} = \frac{9}{12} = \frac{3}{4} \end{aligned}$$

The correct answer is:  
 $3/4$

Question **7**

Correct

Mark 1.00 out of 1.00

Two white mice mate. The male has both a white and a black fur-colour gene. The female has only white fur-colour genes. The fur colour of the offspring depends on the pairs of fur-colour genes that they receive. Assume that neither the white nor the black gene dominates. List the possible outcomes. W = white and B = black. Create the sample space of possible outcomes.

- ☐ a. WW, WW
- ☒ b. WW, BW
- ☐ c. WW, BB
- ☐ d. WB, BW
- ☐ e. None of the other choices is correct



Your answer is correct.

The correct answer is:

WW, BW

Question 8

Correct

Mark 1.00 out of 1.00

Flip a coin twice, create the sample space of possible outcomes. (Below, H stands for Head, T stands for Tail).

- ☒ a. {HH, HT, TH, TT}
- ☐ b. {HT, TH}
- ☐ c. {HH, HT, TT}
- ☐ d. None of the other choices is correct
- ☐ e. {HH, TT, HT, HT}



Your answer is correct.

The correct answer is:

{HH, HT, TH, TT}



Question 9

Correct

Mark 1.00 out of 1.00

Suppose that  $P(A|B) = 0.4$ ,  $P(A|B') = 0.3$ , and  $P(B) = 0.6$ . What is  $P(A)$ ?

- ☐ a. 0.7
- ☐ b. 0.12
- ☐ c. None of these
- ☐ d. 0.1
- ☒ e. 0.36

$$P(A) = P(A \cap B) + P(A \cap B')$$

$B, 0.6 \quad B', 0.4$

A

0.4	0.3

$$P(A) = \dots$$



Your answer is correct.

Apply total probability formula

$$P(A) = P(A|B)P(B) + P(A|B')P(B')$$

$$= 0.4 * 0.6 + 0.3 * 0.4$$

$$= 0.36$$

The correct answer is:

0.36

Question 10

Correct

Mark 1.00 out of 1.00

If  $P(A) = 0.2$ ,  $P(B) = 0.3$ , and  $P(A \cap B) = 0.1$ ,

find  $P(A \cup B)$ ,  $P(A' \cap B)$ .

- ☐ a. None of these
- ☐ b. 0.5, 0.2
- ☐ c. 0.4, 0.1
- ☐ d. 0.5, 0.1
- ☒ e. 0.4, 0.2

$$P(A \cup B) = P(A) + P(B) - P(A \cap B) = \dots$$

$$\begin{aligned} P(A' \cap B) &= P(A' | B) \cdot P(B) \\ &= [1 - P(A | B)] \cdot P(B) \\ &= \left[1 - \frac{P(A \cap B)}{P(B)}\right] \cdot P(B) \end{aligned}$$

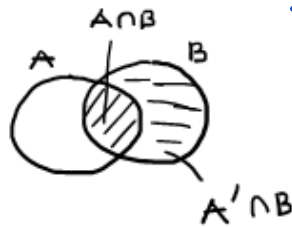


Your answer is correct.

$$B = (A \cap B) \cup (A' \cap B)$$

$$P(A' \cap B) = P(B) - P(A \cap B)$$

$$= 0.3 - 0.1 = 0.2$$



The correct answer is:  
0.4, 0.2

Question **11**

Incorrect

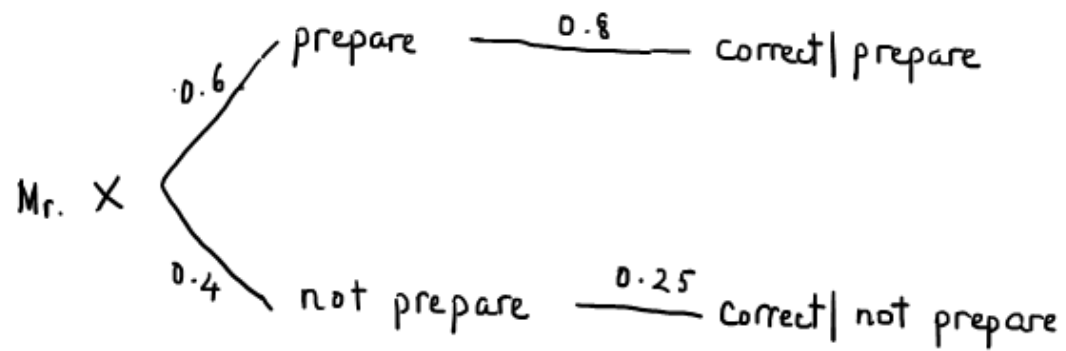
Mark 0.00 out of 1.00

A question on a multiple-choice quiz with 4 options is answered correctly with probability 0.8 if a student is prepared. Without preparation, the probability that a student randomly select the right answer is  $1/4$ . Suppose 60% of students prepare for the quiz and student X correctly gave answer to this question. What is the probability that X did not prepare for the quiz? Round to 2 decimal places.

- ☐ a. 0.17
- ☐ b. 0.10
- ☐ c. 0.58
- ☐ d. 0.50
- ☒ e. 0.82



Your answer is incorrect.



$$P(\text{Correct}) = 0.6 \times 0.8 + 0.4 \times 0.25$$

$$P(\text{not prepare} | \text{correct}) = \frac{P(\text{Correct} | \text{not prepare}) \times P(\text{not prepare})}{P(\text{Correct})}$$

The correct answer is:  
0.17

Question **12**

Correct

Mark 1.00 out of 1.00

Suppose that after 10 years of service, 40% of computers have problems with motherboards (MB), 30% have problems with hard drives (HD), and 15% have problems with both MB and HD. What is the probability that a 10-year old computer has problems with MB or HD?

- ☐ a. 0.45
- ☐ b. 0.4
- ☐ c. 0.7
- ☐ d. 0.3
- ☒ e. 0.55



Your answer is correct.

$$P(\text{MB}) = 0.4, \quad P(\text{HD}) = 0.3, \quad P(\text{MB} \cap \text{HD}) = 0.15$$

$$\Rightarrow P(\text{MB} \cup \text{HD}) = P(\text{MB}) + P(\text{HD}) - P(\text{MB} \cap \text{HD}) = 0.4 + 0.3 - 0.15 = 0.55$$

The correct answer is:  
0.55

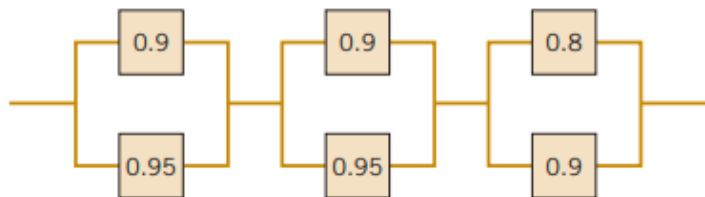
Question **13**

Correct

Mark 1.00 out of 1.00

The following circuit operates if and only if there is a path of functional devices from left to right. The probability that each device functions is as shown. Assume that the probability that a device is functional does not depend on whether or not other devices are functional.

What is the probability that the circuit operates? Round to 3 decimal places.



- ☒ a. 0.970
- ☐ b. 0.926
- ☐ c. 0.975
- ☐ d. None of these
- ☐ e. 0.938



Your answer is correct.

$$(1 - 0.1 \cdot 0.05) \cdot (1 - 0.1 \cdot 0.05) \cdot (1 - 0.2 \cdot 0.1) = 0.970$$

The correct answer is:

0.970

Question 14

Correct

Mark 1.00 out of 1.00

The sample space of a random experiment is  $\{a, b, c, d, e\}$  with probabilities 0.1; 0.2; 0.1; 0.4 and 0.2, respectively. Let A denote the event  $\{a, b, c\}$ , and let B denote the event  $\{c, d, e\}$ . Determine:  $P(A \cap B)$ .

- ☐ a. 0.4
- ☐ b. None of the other choices is correct
- ☐ c. 1
- ☒ d. 0.1
- ☐ e. 0.2

a	b	c	d	e
0,1	0,2	0,1	0,4	0,2

$$P(A \cap B) = P(\{c\}) = 0,1$$



The correct answer is: 0.1

$$\begin{aligned}
 P(A \cup B) &= P(\{a; b; c; d; e\}) \\
 &= 0,1 + 0,2 + 0,1 + 0,4 + 0,2 \\
 &= 1.
 \end{aligned}$$

Question **15**

Correct

Mark 1.00 out of 1.00

A student buys 1000 integrated circuits (ICs) from supplier A, 2000 ICs from supplier B and 3000 ICs from supplier C. He tested the ICs and found that the conditional probability of an IC being defective depends on the supplier from it was bought. Specifically, given that an IC came from supplier A, the probability that it is defective is 0.05; given that an IC came from supplier B, the probability that it is defective is 0.15; given that an IC came from supplier C, the probability that it is defective is 0.20. If ICs from the three supplier are mixed together and one is selected at random, what is the probability that it is defective?

- ☒ a. 0.1583
- ☐ b. 0.06635
- ☐ c. None of the other choices is correct
- ☐ d. 0.09167
- ☐ e. 0.08721



The correct answer is: 0.1583



Question **16**

Correct

Mark 1.00 out of 1.00

An event is \_\_\_\_\_

- ☒ a. a collection of elementary events.
- ☐ b. the list of possible outcomes that can occur from a selection or decision
- ☐ c. more frequently found in business than in other disciplines
- ☐ d. similar to an experiment but not controlled by the decision maker



Your answer is correct.

The correct answer is:  
a collection of elementary events.

Question **17**

Incorrect

Mark 0.00 out of 1.00

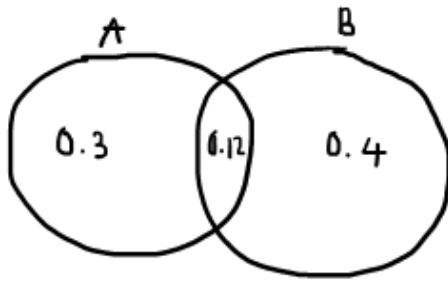
A computer program consists of two blocks written independently by two different programmers. The first block and the second block have an error with probability 0.3 and 0.4, respectively.

Suppose that the program returns an error. What is the probability that there is an error in the second block?  
(round to 2 decimal places)

- ☐ a. 0.69
- ☒ b. 0.12
- ☐ c. 0.33
- ☐ d. 0.52
- ☐ e. 0.21



Your answer is incorrect.



$$P(\text{error}) = P(A \cup B)$$

$$= P(A) + P(B) - P(A \cap B)$$

$$= 0.3 + 0.4 - 0.12 = 0.58$$

$$P(B | \text{error}) = \frac{P(\text{error} | B) P(B)}{P(\text{error})}$$

$$= \frac{1 * 0.4}{0.58} \approx$$

The correct answer is:  
0.69

Question 18

Correct

Mark 1.00 out of 1.00

Two Web colors are used for a site advertisement with given probabilities:

Ad color	Affiliate (30%)	Search (70%)
Blue	0.7	0.4
Green	0.3	0.6

What is the probability that a visitor is from a search site given that the green ad was viewed?  
Round to 2 decimal places.

- ☐ a. None of these
- ☐ b. 0.6
- ☐ c. 0.18
- ☐ d. 0.42
- ☒ e. 0.82

Bayes

$$P(\text{search} | \text{green}) = \frac{P(\text{green} | \text{search}) \cdot P(\text{search})}{P(\text{green})}$$

$$= \frac{0.6 \cdot 70\%}{0.3 \cdot 30\% + 0.6 \cdot 70\%} = \dots$$

✓

Your answer is correct.

$$P(\text{Green}) = P(\text{Green} | \text{Affiliate}) \cdot P(\text{Affiliate}) + P(\text{Green} | \text{Search}) \cdot P(\text{Search}) = 0.3 \cdot 0.3 + 0.6 \cdot 0.7$$

$$P(\text{Search} | \text{Green}) = P(\text{Green} | \text{Search}) \cdot P(\text{Search}) / P(\text{Green})$$

$$= (0.6 \cdot 0.7) / (0.3 \cdot 0.3 + 0.6 \cdot 0.7)$$

The correct answer is:  
0.82

Question **19**

Correct

Mark 1.00 out of 1.00

The outcome of an experiment is the number of resulting heads when a nickel and a dime are flipped simultaneously. What is the sample space for this experiment?

- ☒ a. {0, 1, 2}
- ☐ b. {HH, HT, TT}
- ☐ c. {nickel, dime}
- ☐ d. None of the other choices is correct
- ☐ e. {HH, HT, TH, TT}



Your answer is correct.

The correct answer is:  
{0, 1, 2}.

Question **20**

Correct

Mark 1.00 out of 1.00

Among 20 computers in a store, six have defects. The University Lab bought at random 4 computers.

What is the probability that at least one computer has defects?

Round to 2 decimal places.

- ☐ a. 0.21
- ☐ b. None of these
- ☐ c. 0.38
- ☒ d. 0.79
- ☐ e. 0.62



Your answer is correct.

$P(\text{no computer has defects}) = P(\text{all 4 computers are good}) = C(14,4)/C(20,4)$

$P(\text{at least one computer has defects}) = 1 - P(\text{no computer has defects}) = 1 - C(14,4)/C(20,4)$

The correct answer is:

0.79

Question **21**

Correct

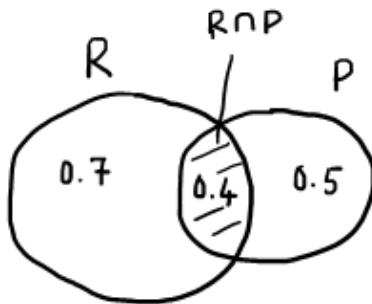
Mark 1.00 out of 1.00

Among math lecturers of a certain university, 70% know R, 50% know Python, and 40% know both languages. If a lecturer knows Python, what is the probability that he/she knows R too?

- ☐ a. 0.5
- ☐ b. None of these
- ☒ c. 0.8
- ☐ d. 1/3
- ☐ e. 4/7



Your answer is correct.



$$P(R | P) = \frac{P(R \cap P)}{P(P)}$$

The correct answer is:  
0.8

Question **22**

Correct

Mark 1.00 out of 1.00

Two events A and B are such that  $P(A \cap B) = 0.25$ ,  $P(A \cup B) = 0.65$  and  $P(A|B) = 0.5$ . Find  $P(B|A)$

- ☐ a. 0.35
- ☒ b. None of the other choices is correct
- ☐ c. 1.15
- ☐ d. 0.3
- ☐ e. 0.5



The correct answer is: None of the other choices is correct



Question 23

Correct

Mark 1.00 out of 1.00

An e-mail filter is planned to separate valid e-mails from spam. The word "free" occurs in 80% of the spam messages and only 5% of the valid messages. Also, 20% of the messages are spam. Find the probability that the message is spam given that it contains "free".

- ☐ a. None of these
- ☐ b. 0.75
- ☐ c. 0.9
- ☐ d. 0.6
- ☒ e. 0.8

	20% spam	80% valid
free	80%	5%

$$P(\text{spam} | \text{free}) = \frac{P(\text{free} | \text{spam}) \cdot P(\text{spam})}{P(\text{free})} = \frac{80\% \cdot 20\%}{80\% \cdot 20\% + 5\% \cdot 80\%}$$

Your answer is correct.

$$P(\text{free}) = P(\text{free} | \text{spam}) P(\text{spam}) + P(\text{free} | \text{Not spam}) P(\text{Not spam})$$

$$P(\text{spam} | \text{free}) = \frac{P(\text{free} | \text{spam}) \cdot P(\text{spam})}{P(\text{free})}$$

The correct answer is:  
0.8

Question **24**

Correct

Mark 1.00 out of 1.00

Given two events A, B such that  $P(B | A) = 0.5$ ,  $P(B) = 0.5$  and  $P(A) = 0.4$

Which of the following statements is/are TRUE?

(i) A and B **independent**

(ii) A and B are **mutually exclusive**

- ☐ a. Both
- ☐ b. Neither
- ☒ c. Only (i)
- ☐ d. Only (ii)



Your answer is correct.

$$P(B | A) = 0.5 = P(B)$$

$\implies$  independent

$$P(A \text{ and } B) = P(B | A) * P(A) = 0.5 * 0.4 = 0.2 < 0 \implies A \text{ and } B \text{ are not mutually exclusive}$$

The correct answer is:

Only (i)

Question **25**

Correct

Mark 1.00 out of 1.00

Suppose you and a friend each choose at random an integer between 1 and 8, where your number is written first and your friend's number second. Which the following statement is TRUE ?

- ☐ a.  $P(\text{sum of the two numbers picked is } < 4) = 3/64$
- ☐ b.  $P(\text{you pick 5 and your friend picks 8}) = 1/64$
- ☐ c.  $P(\text{both numbers match}) = 8/64$
- ☒ d. All of the others.



The correct answer is: All of the others.

