Lecturer:	Date	Approved by:	Date
Dr. Nguyen Tien Dung	*October 6^{th}, 2023*		*October 6^{th}, 2023*

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UNIVERSITY OF TECHNOLOGY - VNUHCM Faculty of Applied Science	Midterm Exam	Academic year	2023-2024	Semester	1
		Exam date	October 16^{th}, 2023		
	Course title	Probability and Statistics		Score	
	Course ID	MT2013	Sheet code	**2311**	
	Duration	50 minutes	Shift	7:00	

Instructions to students:

- *You are allowed to use your OWN materials and calculator. Total available score: 10.*
- *At the beginning of the working time, you MUST fill in your full name and student ID on this question sheet. There are 20 questions on 3 pages.*
- *Do not round between steps. Round your final answers to 4 decimal places.*

Student's full name:	Invigilator 1: . . . .
Student Id: . . . . Group:	Invigilator 2: . . . .

1. Let A and B be two events such that $P(A) = 0.21$ and $P(A \cap B) = 0.16$. Find the probability $P(B)$ such that A and B are independent.

   (A) 0.6619 (B) 0.7619 (C) 0.8719 (D) 0.8819 (E) 0.3319

2. Suppose that the probability for you to win 381 dollars in a game is 15%, while the probability of losing 15 dollars is 85%. Compute your average net gain in a game.

   (A) Lose 34.4 dollars. (B) Win 47.4 dollars. (C) Win 39.4 dollars. (D) Lose 50.4 dollars. (E) Win 44.4 dollars.

3. Consider three events A, B, and C in the sample space Ω such that $P(A) = 0.25$, $P(B) = 0.12$, $P(C) = 0.11$, and $P(A|C) = 0.16$. Suppose that A and B are independent. In addition, B and C are disjoint. Compute $P(A \cup B \cup C)$.

   (A) 0.4324 (B) 0.6324 (C) 0.7424 (D) 0.3624 (E) 0.5824

4. Which of the following functions is the probability density function of random variable? Assume that these functions are zero outside the given interval.

   (A) $f(x) = 3x^2,\ 0 \le x \le 1/3$ (B) $f(x) = 4x - 1,\ 0 \le x \le 1$ (C) $f(x) = 2\cos 2x,\ \pi/2 \le x \le 3\pi/4$ (D) $f(x) = 2e^{2x},\ 0 \le x \le 1$ (E) $f(x) = 2\sin 2x,\ 0 \le x \le \pi/4$

Questions 5 through 8. The diameter of a molecule (in micrometer) is a random varible with the following probability density function

$$f(x) = \begin{cases} \dfrac{8k}{(x-6)^2}, & \text{if } 0 \le x \le 2 \\ 0 & \text{, otherwise} \end{cases}$$

5. Determine the constant k. (A) 1.6445 (B) 1.2445 (C) 1.1445 (D) 0.9445 (E) 1.5

6. Find the value of the cumulative distribution function at 1.9.

   (A) 0.5713 (B) 0.9713 (C) 0.9268 (D) 0.4713 (E) 0.7713

7. Put $Y = 2X + 8$. What is the mean of Y?

   (A) 9.8133 (B) 10.4133 (C) 10.2688 (D) 10.1133 (E) 10.3133

8. Find the median of the diameter of a molecule.

   (A) 1.6445 (B) 1.5445 (C) 1.3445 (D) 1.2 (E) 1.4445

Questions 9 through 12. There are three methods to conduct an experiment and the probabilities of success for these methods are 0.75, 0.7, and 0.7 respectively. One student randomly selects a method and use it to carry on the experiment two times independently. Denote by X the number of successes.

9. Find the probability that the first methods is selected and fails twice.

   (A) 0.4808 (B) 0.0908 (C) 0.4008 (D) 0.0208 (E) 0.2808

10. Find the probability that there is exactly one failure.

    (A) 0.095 (B) 0.405 (C) 0.145 (D) 0.605 (E) 0.325

11. What is the mean of X?

    (A) 1.3633 (B) 1.4333 (C) 0.9633 (D) 1.2433 (E) 1.5033

12. Suppose that each failure costs the student 1.5 dollars. Compute the variance of the failure cost.

    (A) 1.4363 (B) 0.9163 (C) 1.3663 (D) 0.5863 (E) 0.8363

Questions 13 through 16. Assume that the number of defects on a product of a production line is a random variable following a Poisson distribution and the numbers are independent across products. A product with at least one defect will be classified as a defective product. Assume further that the percentage of defective products made by this production line is 0.025.

13. Compute the average number of defects on a product of this production line.

    (A) 0.5163 (B) 0.0253 (C) 0.1463 (D) 0.5663 (E) 0.1563

14. What is the standard deviation of the average number of defects on products of the production line?

    (A) 0.2266 (B) 0.1666 (C) 0.7066 (D) 0.7966 (E) 0.0365

15. Select 19 products of the production line randomly. Calculate the probability that there are at most 2 defective products.

    (A) 0.4888 (B) 0.5388 (C) 0.9888 (D) 0.4988 (E) 0.6888

16. Suppose further that the number of defective products of the production line per hour also follows a Poisson distribution with an average of 3 defective productions per hour. Calculate the probability that the time beween two consecutive defective items does not exceed 49 minutes.

    (A) 0.4937 (B) 0.8637 (C) 0.7137 (D) 0.9137 (E) 0.5937

Questions 17 through 20. Billy uses his smartphone X minutes everyday where X is a random variable following a normal distribution with a mean of 116 minutes and a standard deviation of 6 minutes.

17. Find the probability that Billy uses his smartphone less than 125.8 minutes in one day.

    (A) 0.5044 (B) 0.8377 (C) 0.7266 (D) 0.6155 (E) 0.9488

18. Determine an interval centered at 116 such that X takes values in that interval in 83% days.

    (A) (113, 119) (B) (105, 127) (C) (107.78, 124.22) (D) (100, 132) (E) (107, 125)

19. Compute the probability that there are at least three days of a week (7 days) in which Billy uses his smartphone more than 125.8 minutes per day.

    (A) 0.3285 (B) 0.004 (C) 0.0535 (D) 0.1085 (E) 0.4935

20. Find the probability that, on average, Billy uses his smartphone less than 125.8 minutes per day in a week. (A) 0.6645 (B) 0.5545 (C) 0.7195 (D) 1 (E) 0.4995

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UNIVERSITY OF TECHNOLOGY - VNUHCM **Faculty of Applied Science**	**Midterm Exam**		Academic year	2023-2024	Semester	1
			Exam date	October 16^{th}, 2023		
	Course title	Probability and Statistics			**Score**	
	Course ID	MT2013	Sheet code	**2312**		
	Duration	50 minutes	Shift	7:00		

Instructions to students:

- *You are allowed to use your OWN materials and calculator. Total available score: 10.*
- *At the beginning of the working time, you MUST fill in your full name and student ID on this question sheet. There are 20 questions on 3 pages.*
- *Do not round between steps. Round your final answers to 4 decimal places.*

Student's full name: . . . . Invigilator 1: . . . .

Student Id: . . . . Group: . . . . Invigilator 2: . . . .

1. Let A and B be two events such that $P(A) = 0.28$ and $P(A \cap B) = 0.25$. Find the probability $P(B)$ such that A and B are independent.

   (A) 0.7729 (B) 0.7129 (C) 0.6429 (D) 0.8029 (E) 0.8929

2. Suppose that the probability for you to win 276 dollars in a game is 28%, while the probability of losing 49 dollars is 72%. Compute your average net gain in a game.

   (A) Lose 41 dollars. (B) Win 43 dollars. (C) Win 42 dollars. (D) Lose 45 dollars. (E) Win 43 dollars.

3. Consider three events A, B, and C in the sample space Ω such that $P(A) = 0.17$, $P(B) = 0.27$, $P(C) = 0.3$, and $P(B|C) = 0.19$. Suppose that A and B are independent. In addition, A and C are disjoint. Compute $P(A \cup B \cup C)$.

   (A) 0.7471 (B) 0.8871 (C) 0.6371 (D) 0.7271 (E) 0.4771

4. Which of the following functions is the probability density function of random variable? Assume that these functions are zero outside the given interval.

   (A) $f(x) = 2\cos 2x,\ \pi/2 \le x \le 3\pi/4$ (B) $f(x) = 2e^{2x},\ 0 \le x \le 1$ (C) $f(x) = 2\sin 2x,\ 0 \le x \le \pi/4$ (D) $f(x) = 3x^2,\ 0 \le x \le 1/3$ (E) $f(x) = 4x - 1,\ 0 \le x \le 1$

Questions 5 through 8. The diameter of a molecule (in micrometer) is a random varible with the following probability density function

$$f(x) = \begin{cases} \dfrac{10k}{(x-8)^2}, & \text{if } 0 \le x \le 4 \\ 0 & , \text{ otherwise} \end{cases}$$

5. Determine the constant k. (A) 0.4445 (B) 1.1445 (C) 0.9445 (D) 0.8445 (E) 0.8

6. Find the value of the cumulative distribution function at 2.7.

   (A) 0.3539 (B) 0.1539 (C) 0.0539 (D) 0.2539 (E) 0.5094

7. Put $Y = 2X + 4$. What is the mean of Y?

   (A) 9.1541 (B) 8.7541 (C) 8.4541 (D) 9.0541 (E) 8.9096

8. Find the median of the diameter of a molecule.

   Ⓐ 2.7112 Ⓑ 2.6667 Ⓒ 2.3112 Ⓓ 2.2112 Ⓔ 2.8112

Questions 9 through 12. There are three methods to conduct an experiment and the probabilities of success for these methods are 0.85, 0.9, and 0.75 respectively. One student randomly selects a method and use it to carry on the experiment two times independently. Denote by X the number of successes.

9. Find the probability that the first methods is selected and fails twice.

   Ⓐ 0.0075 Ⓑ 0.4475 Ⓒ 0.1175 Ⓓ 0.0375 Ⓔ 0.3575

10. Find the probability that there is exactly one failure.

    Ⓐ 0.62 Ⓑ 0.66 Ⓒ 0.22 Ⓓ 0.27 Ⓔ 0.46

11. What is the mean of X?

    Ⓐ 2.0567 Ⓑ 1.7667 Ⓒ 1.6667 Ⓓ 1.9367 Ⓔ 2.1067

12. Suppose that each failure costs the student 2 dollars. Compute the variance of the failure cost.

    Ⓐ 1.6722 Ⓑ 1.5022 Ⓒ 0.8322 Ⓓ 1.5622 Ⓔ 1.1422

Questions 13 through 16. Assume that the number of defects on a product of a production line is a random variable following a Poisson distribution and the numbers are independent across products. A product with at least one defect will be classified as a defective product. Assume further that the percentage of defective products made by this production line is 0.175.

13. Compute the average number of defects on a product of this production line.

    Ⓐ 0.1924 Ⓑ 0.5134 Ⓒ 0.7334 Ⓓ 0.2334 Ⓔ 0.8434

14. What is the standard deviation of the average number of defects on products of the production line?

    Ⓐ 0.2988 Ⓑ 0.1387 Ⓒ 0.6388 Ⓓ 0.3788 Ⓔ 0.7688

15. Select 10 products of the production line randomly. Calculate the probability that there are at most 1 defective products.

    Ⓐ 0.7359 Ⓑ 0.8559 Ⓒ 0.4559 Ⓓ 0.3759 Ⓔ 0.8759

16. Suppose further that the number of defective products of the production line per hour also follows a Poisson distribution with an average of 3 defective productions per hour. Calculate the probability that the time beween two consecutive defective items does not exceed 40 minutes.

    Ⓐ 0.7547 Ⓑ 0.4547 Ⓒ 0.4047 Ⓓ 0.8147 Ⓔ 0.8647

Questions 17 through 20. Autry uses his smartphone X minutes everyday where X is a random variable following a normal distribution with a mean of 106 minutes and a standard deviation of 14 minutes.

17. Find the probability that Autry uses his smartphone less than 84.2 minutes in one day.

    Ⓐ 0.6152 Ⓑ 0.0597 Ⓒ 0.2819 Ⓓ 0.393 Ⓔ 0.1708

18. Determine an interval centered at 106 such that X takes values in that interval in 85% days.

    Ⓐ (72, 140) Ⓑ (101, 111) Ⓒ (80, 132) Ⓓ (103, 109) Ⓔ (85.84, 126.16)

19. Compute the probability that there are at least three days of a week (7 days) in which Autry uses his smartphone more than 84.2 minutes per day.

    (A) 0.5545 (B) 0.6095 (C) 1 (D) 0.7195 (E) 0.8845

20. Find the probability that, on average, Autry uses his smartphone less than 84.2 minutes per day in a week. (A) 0.0495 (B) 0.2145 (C) 0.4345 (D) 0.1045 (E) 0

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<table>
<tr><td rowspan="3">UNIVERSITY OF TECHNOLOGY - VNUHCM
Faculty of Applied Science</td><td colspan="2" rowspan="1">Midterm Exam</td><td>Academic year</td><td>2023-2024</td><td>Semester</td><td>1</td></tr>
<tr><td>Course title</td><td colspan="3">Probability and Statistics</td><td>Exam date: October 16th, 2023</td><td rowspan="2">**Score**</td></tr>
<tr><td>Course ID
Duration</td><td>MT2013
50 minutes</td><td>Sheet code
Shift</td><td>**2313**
7:00</td><td></td></tr>
</table>

Instructions to students:

- *You are allowed to use your OWN materials and calculator. Total available score: 10.*
- *At the beginning of the working time, you MUST fill in your full name and student ID on this question sheet. There are 20 questions on 3 pages.*
- *Do not round between steps. Round your final answers to 4 decimal places.*

Student's full name:	Invigilator 1: . . . .
Student Id: . . . . Group:	Invigilator 2: . . . .

1. Let A and B be two events such that $P(A) = 0.44$ and $P(A \cap B) = 0.39$. Find the probability $P(B)$ such that A and B are independent.

   Ⓐ 0.8864 Ⓑ 0.8064 Ⓒ 0.6664 Ⓓ 0.5364 Ⓔ 0.9864

2. Suppose that the probability for you to win 261 dollars in a game is 17%, while the probability of losing 13 dollars is 83%. Compute your average net gain in a game.

   Ⓐ Lose 41.58 dollars. Ⓑ Win 33.58 dollars. Ⓒ Win 31.58 dollars. Ⓓ Win 25.58 dollars. Ⓔ Lose 38.58 dollars.

3. Consider three events A, B, and C in the sample space Ω such that $P(A) = 0.14$, $P(B) = 0.13$, $P(C) = 0.29$, and $P(B|C) = 0.2$. Suppose that A and B are independent. In addition, A and C are disjoint. Compute $P(A \cup B \cup C)$.

   Ⓐ 0.6438 Ⓑ 0.0438 Ⓒ 0.5438 Ⓓ 0.4838 Ⓔ 0.1738

4. Which of the following functions is the probability density function of random variable? Assume that these functions are zero outside the given interval.

   Ⓐ $f(x) = 2e^{2x},\ 0 \le x \le 1$ Ⓑ $f(x) = 2\cos 2x,\ \pi/2 \le x \le 3\pi/4$ Ⓒ $f(x) = 3x^2,\ 0 \le x \le 1/3$ Ⓓ $f(x) = 4x - 1,\ 0 \le x \le 1$ Ⓔ $f(x) = 2\sin 2x,\ 0 \le x \le \pi/4$

Questions 5 through 8. The diameter of a molecule (in micrometer) is a random varible with the following probability density function

$$f(x) = \begin{cases} \dfrac{10k}{(x-8)^2}, & \text{if } 0 \le x \le 4 \\ 0 & \text{, otherwise} \end{cases}$$

5. Determine the constant k. Ⓐ 1.1445 Ⓑ 0.8445 Ⓒ 0.4445 Ⓓ 0.8 Ⓔ 0.5445

6. Find the value of the cumulative distribution function at 3.2.

   Ⓐ 0.6667 Ⓑ 0.4112 Ⓒ 0.2112 Ⓓ 0.1112 Ⓔ 0.5112

7. Put $Y = 4X + 6$. What is the mean of Y?

   Ⓐ 15.3638 Ⓑ 16.1638 Ⓒ 16.2638 Ⓓ 15.8193 Ⓔ 16.3638

8. Find the median of the diameter of a molecule.

   (A) 2.7112 (B) 2.6667 (C) 2.4112 (D) 3.2112 (E) 2.5112

Questions 9 through 12. There are three methods to conduct an experiment and the probabilities of success for these methods are 0.7, 0.8, and 0.9 respectively. One student randomly selects a method and use it to carry on the experiment two times independently. Denote by X the number of successes.

9. Find the probability that the first methods is selected and fails twice.

   (A) 0.51 (B) 0.34 (C) 0.03 (D) 0.45 (E) 0.3

10. Find the probability that there is exactly one failure.

    (A) 0.3067 (B) 0.6667 (C) 0.6067 (D) 0.3667 (E) 0.2067

11. What is the mean of X?

    (A) 1.6 (B) 1.72 (C) 1.44 (D) 2.01 (E) 1.81

12. Suppose that each failure costs the student 2 dollars. Compute the variance of the failure cost.

    (A) 1.2533 (B) 1.3333 (C) 1.8533 (D) 1.1533 (E) 0.9533

Questions 13 through 16. Assume that the number of defects on a product of a production line is a random variable following a Poisson distribution and the numbers are independent across products. A product with at least one defect will be classified as a defective product. Assume further that the percentage of defective products made by this production line is 0.175.

13. Compute the average number of defects on a product of this production line.

    (A) 0.3234 (B) 1.1034 (C) 0.7534 (D) 0.6234 (E) 0.1924

14. What is the standard deviation of the average number of defects on products of the production line?

    (A) 0.5133 (B) 0.1132 (C) 0.9933 (D) 0.2433 (E) 0.5533

15. Select 15 products of the production line randomly. Calculate the probability that there are at most 1 defective products.

    (A) 0.1434 (B) 0.4134 (C) 0.2134 (D) 0.3434 (E) 0.2334

16. Suppose further that the number of defective products of the production line per hour also follows a Poisson distribution with an average of 1 defective productions per hour. Calculate the probability that the time beween two consecutive defective items does not exceed 38 minutes.

    (A) 0.9392 (B) 0.4592 (C) 0.4692 (D) 0.0992 (E) 0.8192

Questions 17 through 20. Jonathan uses his smartphone X minutes everyday where X is a random variable following a normal distribution with a mean of 104 minutes and a standard deviation of 9 minutes.

17. Find the probability that Jonathan uses his smartphone less than 104.4 minutes in one day.

    (A) 0.2955 (B) 0.6288 (C) 0.851 (D) 0.5177 (E) 0.4066

18. Determine an interval centered at 104 such that X takes values in that interval in 88% days.

    (A) (90.05, 117.95) (B) (100, 108) (C) (94, 114) (D) (80, 128) (E) (86, 122)

19. Compute the probability that there are at least three days of a week (7 days) in which Jonathan uses his smartphone more than 104.4 minutes per day.

    (A) 0.3529 (B) 0.5729 (C) 0.7434 (D) 0.4629 (E) 0.5179

20. Find the probability that, on average, Jonathan uses his smartphone less than 104.4 minutes per day in a week. (A) 0.5468 (B) 0.7613 (C) 0.5963 (D) 0.1013 (E) 0.4313

Lecturer: Dr. Nguyen Tien Dung	*Date* *October 6^{th}, 2023*	**Approved by:**	*Date* *October 6^{th}, 2023*

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UNIVERSITY OF TECHNOLOGY - VNUHCM Faculty of Applied Science	**Midterm Exam**		Academic year	2023-2024	Semester	1
			Exam date	October 16^{th}, 2023		
	Course title	Probability and Statistics			**Score**	
	Course ID	MT2013	Sheet code	**2314**		
	Duration	50 minutes	Shift	7:00		

Instructions to students:

- *You are allowed to use your OWN materials and calculator. Total available score: 10.*
- *At the beginning of the working time, you MUST fill in your full name and student ID on this question sheet. There are 20 questions on 3 pages.*
- *Do not round between steps. Round your final answers to 4 decimal places.*

Student's full name:	Invigilator 1: . . . .
Student Id: . . . . Group:	Invigilator 2: . . . .

1. Let A and B be two events such that $P(A) = 0.28$ and $P(A \cap B) = 0.24$. Find the probability $P(B)$ such that A and B are independent.

   (A) 0.7571 (B) 0.3671 (C) 0.6071 (D) 0.8571 (E) 0.6371

2. Suppose that the probability for you to win 292 dollars in a game is 11%, while the probability of losing 34 dollars is 89%. Compute your average net gain in a game.

   (A) Lose 8.86 dollars. (B) Win 1.86 dollars. (C) Lose 7.86 dollars. (D) Win 9.86 dollars. (E) Win 0.14 dollars.

3. Consider three events A, B, and C in the sample space Ω such that $P(A) = 0.19$, $P(B) = 0.22$, $P(C) = 0.17$, and $P(B|C) = 0.13$. Suppose that A and B are independent. In addition, A and C are disjoint. Compute $P(A \cup B \cup C)$.

   (A) 0.1761 (B) 0.4761 (C) 0.0461 (D) 0.8561 (E) 0.5161

4. Which of the following functions is the probability density function of random variable? Assume that these functions are zero outside the given interval.

   (A) $f(x) = 4x - 1,\ 0 \le x \le 1$ (B) $f(x) = 2\sin 2x,\ 0 \le x \le \pi/4$ (C) $f(x) = 2\cos 2x,\ \pi/2 \le x \le 3\pi/4$ (D) $f(x) = 3x^2,\ 0 \le x \le 1/3$ (E) $f(x) = 2e^{2x},\ 0 \le x \le 1$

Questions 5 through 8. The diameter of a molecule (in micrometer) is a random varible with the following probability density function

$$f(x) = \begin{cases} \dfrac{10k}{(x-6)^2}, & \text{if } 0 \le x \le 2 \\ 0 & \text{, otherwise} \end{cases}$$

5. Determine the constant k. (A) 0.7445 (B) 1.6445 (C) 1.2 (D) 0.9445 (E) 0.8445

6. Find the value of the cumulative distribution function at 1.6.

   (A) 0.8718 (B) 0.7273 (C) 0.4718 (D) 0.7718 (E) 0.3718

7. Put $Y = 2X + 4$. What is the mean of Y?

   (A) 5.7133 (B) 6.4133 (C) 5.9133 (D) 6.2688 (E) 6.8133

8. Find the median of the diameter of a molecule.

   (A) 1.2 (B) 1.7445 (C) 0.6445 (D) 0.7445 (E) 1.4445

Questions 9 through 12. There are three methods to conduct an experiment and the probabilities of success for these methods are 0.8, 0.85, and 0.85 respectively. One student randomly selects a method and use it to carry on the experiment two times independently. Denote by X the number of successes.

9. Find the probability that the first methods is selected and fails twice.

   (A) 0.3933 (B) 0.5433 (C) 0.3533 (D) 0.0133 (E) 0.4433

10. Find the probability that there is exactly one failure.

    (A) 0.0667 (B) 0.0067 (C) 0.2767 (D) 0.0467 (E) 0.0867

11. What is the mean of X?

    (A) 2.0667 (B) 1.6667 (C) 2.0067 (D) 1.8367 (E) 2.1567

12. Suppose that each failure costs the student 2 dollars. Compute the variance of the failure cost.

    (A) 1.6256 (B) 1.1456 (C) 1.1156 (D) 1.3656 (E) 1.2456

Questions 13 through 16. Assume that the number of defects on a product of a production line is a random variable following a Poisson distribution and the numbers are independent across products. A product with at least one defect will be classified as a defective product. Assume further that the percentage of defective products made by this production line is 0.075.

13. Compute the average number of defects on a product of this production line.

    (A) 0.759 (B) 0.929 (C) 0.078 (D) 0.649 (E) 0.079

14. What is the standard deviation of the average number of defects on products of the production line?

    (A) 0.8142 (B) 0.0641 (C) 0.3642 (D) 0.0142 (E) 0.4342

15. Select 19 products of the production line randomly. Calculate the probability that there are at most 2 defective products.

    (A) 0.6332 (B) 0.8332 (C) 0.6532 (D) 0.8432 (E) 0.3832

16. Suppose further that the number of defective products of the production line per hour also follows a Poisson distribution with an average of 3 defective productions per hour. Calculate the probability that the time beween two consecutive defective items does not exceed 23 minutes.

    (A) 0.6834 (B) 0.6734 (C) 0.7334 (D) 0.9634 (E) 0.3234

Questions 17 through 20. Trevante uses his smartphone X minutes everyday where X is a random variable following a normal distribution with a mean of 106 minutes and a standard deviation of 20 minutes.

17. Find the probability that Trevante uses his smartphone less than 77.6 minutes in one day.

    (A) 0.0778 (B) 0.6333 (C) 0.3 (D) 0.5222 (E) 0.4111

18. Determine an interval centered at 106 such that X takes values in that interval in 95% days.

    (A) (66.8, 145.2) (B) (33, 179) (C) (64, 148) (D) (58, 154) (E) (73, 139)

19. Compute the probability that there are at least three days of a week (7 days) in which Trevante uses his smartphone more than 77.6 minutes per day.

    (A) 0.9999 (B) 0.9394 (C) 0.7744 (D) 0.8294 (E) 0.4444

20. Find the probability that, on average, Trevante uses his smartphone less than 77.6 minutes per day in a week. (A) 0.2696 (B) 0.4896 (C) 0.1046 (D) 0.0001 (E) 0.1596

Lecturer: Dr. Nguyen Tien Dung	*Date* *October 6th, 2023*	**Approved by:**	*Date* *October 6th, 2023*

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UNIVERSITY OF TECHNOLOGY - VNUHCM **Faculty of Applied Science**	**Midterm Exam**		Academic year	2023-2024	Semester	1
			Exam date	October 16th, 2023		
	Course title	Probability and Statistics			**Score**	
	Course ID	MT2013	Sheet code	**2315**		
	Duration	50 minutes	Shift	7:00		

Instructions to students:

- *You are allowed to use your OWN materials and calculator. Total available score: 10.*
- *At the beginning of the working time, you MUST fill in your full name and student ID on this question sheet. There are 20 questions on 3 pages.*
- *Do not round between steps. Round your final answers to 4 decimal places.*

Student's full name:	Invigilator 1: . . . .
Student Id: . . . . Group:	Invigilator 2: . . . .

1. Let A and B be two events such that $P(A) = 0.43$ and $P(A \cap B) = 0.24$. Find the probability $P(B)$ such that A and B are independent.

   (A) 0.2981 (B) 0.8581 (C) 0.5581 (D) 0.9381 (E) 0.4381

2. Suppose that the probability for you to win 419 dollars in a game is 20%, while the probability of losing 21 dollars is 80%. Compute your average net gain in a game.

   (A) Win 74 dollars. (B) Win 71 dollars. (C) Lose 76 dollars. (D) Win 67 dollars. (E) Lose 74 dollars.

3. Consider three events A, B, and C in the sample space Ω such that $P(A) = 0.28$, $P(B) = 0.3$, $P(C) = 0.13$, and $P(B|C) = 0.27$. Suppose that A and B are independent. In addition, A and C are disjoint. Compute $P(A \cup B \cup C)$.

   (A) 0.9609 (B) 0.5909 (C) 0.0909 (D) 0.4709 (E) 0.8209

4. Which of the following functions is the probability density function of random variable? Assume that these functions are zero outside the given interval.

   (A) $f(x) = 2e^{2x},\ 0 \le x \le 1$ (B) $f(x) = 4x - 1,\ 0 \le x \le 1$ (C) $f(x) = 3x^2,\ 0 \le x \le 1/3$ (D) $f(x) = 2\cos 2x,\ \pi/2 \le x \le 3\pi/4$ (E) $f(x) = 2\sin 2x,\ 0 \le x \le \pi/4$

Questions 5 through 8. The diameter of a molecule (in micrometer) is a random varible with the following probability density function

$$f(x) = \begin{cases} \dfrac{10k}{(x-4)^2}, & \text{if } 0 \le x \le 2 \\ 0 & , \text{ otherwise} \end{cases}$$

5. Determine the constant k. (A) 0.5445 (B) 0.9445 (C) 0.4445 (D) 0.8445 (E) 0.4

6. Find the value of the cumulative distribution function at 1.5.

   (A) 0.1445 (B) 0.9445 (C) 0.3445 (D) 0.7445 (E) 0.6

7. Put $Y = 4X + 6$. What is the mean of Y?

   (A) 10.9541 (B) 10.9096 (C) 11.2541 (D) 11.1541 (E) 11.4541

8. Find the median of the diameter of a molecule.

   Ⓐ 0.9778 Ⓑ 1.4778 Ⓒ 0.8778 Ⓓ 1.3333 Ⓔ 1.0778

Questions 9 through 12. There are three methods to conduct an experiment and the probabilities of success for these methods are 0.6, 0.7, and 0.65 respectively. One student randomly selects a method and use it to carry on the experiment two times independently. Denote by X the number of successes.

9. Find the probability that the first methods is selected and fails twice.

   Ⓐ 0.0133 Ⓑ 0.5133 Ⓒ 0.5933 Ⓓ 0.3433 Ⓔ 0.0533

10. Find the probability that there is exactly one failure.

    Ⓐ 0.4517 Ⓑ 0.4917 Ⓒ 0.7217 Ⓓ 0.0717 Ⓔ 0.0417

11. What is the mean of X?

    Ⓐ 1.3 Ⓑ 1.13 Ⓒ 1.49 Ⓓ 1.68 Ⓔ 0.82

12. Suppose that each failure costs the student 1.5 dollars. Compute the variance of the failure cost.

    Ⓐ 1.0313 Ⓑ 1.4813 Ⓒ 0.6913 Ⓓ 1.4913 Ⓔ 0.5513

Questions 13 through 16. Assume that the number of defects on a product of a production line is a random variable following a Poisson distribution and the numbers are independent across products. A product with at least one defect will be classified as a defective product. Assume further that the percentage of defective products made by this production line is 0.035.

13. Compute the average number of defects on a product of this production line.

    Ⓐ 0.8166 Ⓑ 0.0566 Ⓒ 0.0356 Ⓓ 0.8366 Ⓔ 0.3266

14. What is the standard deviation of the average number of defects on products of the production line?

    Ⓐ 0.6805 Ⓑ 0.5505 Ⓒ 0.3605 Ⓓ 0.0504 Ⓔ 0.6705

15. Select 14 products of the production line randomly. Calculate the probability that there are at most 2 defective products.

    Ⓐ 0.7083 Ⓑ 0.9883 Ⓒ 0.6783 Ⓓ 0.7783 Ⓔ 0.5783

16. Suppose further that the number of defective products of the production line per hour also follows a Poisson distribution with an average of 3 defective productions per hour. Calculate the probability that the time beween two consecutive defective items does not exceed 25 minutes.

    Ⓐ 0.6335 Ⓑ 0.4035 Ⓒ 0.6935 Ⓓ 0.7135 Ⓔ 0.6735

Questions 17 through 20. Aarón uses his smartphone X minutes everyday where X is a random variable following a normal distribution with a mean of 90 minutes and a standard deviation of 13 minutes.

17. Find the probability that Aarón uses his smartphone less than 81.5 minutes in one day.

    Ⓐ 0.4788 Ⓑ 0.2566 Ⓒ 0.701 Ⓓ 0.3677 Ⓔ 0.1455

18. Determine an interval centered at 90 such that X takes values in that interval in 85% days.

    Ⓐ (69, 111) Ⓑ (59, 121) Ⓒ (71.28, 108.72) Ⓓ (89, 91) Ⓔ (64, 116)

19. Compute the probability that there are at least three days of a week (7 days) in which Aarón uses his smartphone more than 81.5 minutes per day.

    (A) 0.9855 (B) 0.54 (C) 0.43 (D) 0.925 (E) 0.485

20. Find the probability that, on average, Aarón uses his smartphone less than 81.5 minutes per day in a week. (A) 0.4213 (B) 0.1463 (C) 0.0913 (D) 0.0418 (E) 0.2563

Lecturer:	*Date*	**Approved by:**	*Date*
Dr. Nguyen Tien Dung	*October 6^{th}, 2023*		*October 6^{th}, 2023*

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UNIVERSITY OF TECHNOLOGY - VNUHCM **Faculty of Applied Science**	**Midterm Exam**	Academic year	2023-2024	Semester	1
		Exam date	October 16^{th}, 2023		
	Course title	Probability and Statistics		**Score**	
	Course ID	MT2013	Sheet code	**2316**	
	Duration	50 minutes	Shift	7:00	

Instructions to students:

- *You are allowed to use your OWN materials and calculator. Total available score: 10.*
- *At the beginning of the working time, you MUST fill in your full name and student ID on this question sheet. There are 20 questions on 3 pages.*
- *Do not round between steps. Round your final answers to 4 decimal places.*

Student's full name:	Invigilator 1: . . . .
Student Id: . . . . Group:	Invigilator 2: . . . .

1. Let A and B be two events such that $P(A) = 0.38$ and $P(A \cap B) = 0.35$. Find the probability $P(B)$ such that A and B are independent.

   (A) 0.8511 (B) 0.7611 (C) 0.7811 (D) 0.7311 (E) 0.9211

2. Suppose that the probability for you to win 237 dollars in a game is 21%, while the probability of losing 47 dollars is 79%. Compute your average net gain in a game.

   (A) Win 22.64 dollars. (B) Win 12.64 dollars. (C) Lose 8.64 dollars. (D) Win 19.64 dollars. (E) Lose 17.64 dollars.

3. Consider three events A, B, and C in the sample space Ω such that $P(A) = 0.25$, $P(B) = 0.3$, $P(C) = 0.27$, and $P(B|C) = 0.2$. Suppose that A and B are independent. In addition, A and C are disjoint. Compute $P(A \cup B \cup C)$.

   (A) 0.751 (B) 0.701 (C) 0.401 (D) 0.501 (E) 0.691

4. Which of the following functions is the probability density function of random variable? Assume that these functions are zero outside the given interval.

   (A) $f(x) = 2\cos 2x,\ \pi/2 \le x \le 3\pi/4$ (B) $f(x) = 2\sin 2x,\ 0 \le x \le \pi/4$ (C) $f(x) = 3x^2,\ 0 \le x \le 1/3$ (D) $f(x) = 4x - 1,\ 0 \le x \le 1$ (E) $f(x) = 2e^{2x},\ 0 \le x \le 1$

Questions 5 through 8. The diameter of a molecule (in micrometer) is a random varible with the following probability density function

$$f(x) = \begin{cases} \dfrac{8k}{(x-6)^2}, & \text{if } 0 \le x \le 4 \\ 0 & , \text{otherwise} \end{cases}$$

5. Determine the constant k. (A) 0.1195 (B) 0.0195 (C) 0.6195 (D) 0.2195 (E) 0.375

6. Find the value of the cumulative distribution function at 3.2.

   (A) 0.9159 (B) 0.5714 (C) 0.3159 (D) 0.0159 (E) 0.1159

7. Put $Y = 4X + 8$. What is the mean of Y?

   (A) 18.8167 (B) 19.1612 (C) 19.3612 (D) 19.2612 (E) 18.9612

8. Find the median of the diameter of a molecule.

   Ⓐ 2.7445 Ⓑ 3.4445 Ⓒ 2.5445 Ⓓ 3.1445 Ⓔ 3

Questions 9 through 12. There are three methods to conduct an experiment and the probabilities of success for these methods are 0.75, 0.6, and 0.8 respectively. One student randomly selects a method and use it to carry on the experiment two times independently. Denote by X the number of successes.

9. Find the probability that the first methods is selected and fails twice.

   Ⓐ 0.2808 Ⓑ 0.3208 Ⓒ 0.1108 Ⓓ 0.0208 Ⓔ 0.5308

10. Find the probability that there is exactly one failure.

    Ⓐ 0.3917 Ⓑ 0.0017 Ⓒ 0.7717 Ⓓ 0.4817 Ⓔ 0.6917

11. What is the mean of X?

    Ⓐ 1.9633 Ⓑ 1.4333 Ⓒ 1.6333 Ⓓ 1.2433 Ⓔ 0.9733

12. Suppose that each failure costs the student 1.5 dollars. Compute the variance of the failure cost.

    Ⓐ 1.0663 Ⓑ 1.3963 Ⓒ 0.4163 Ⓓ 0.9463 Ⓔ 0.9063

Questions 13 through 16. Assume that the number of defects on a product of a production line is a random variable following a Poisson distribution and the numbers are independent across products. A product with at least one defect will be classified as a defective product. Assume further that the percentage of defective products made by this production line is 0.095.

13. Compute the average number of defects on a product of this production line.

    Ⓐ 0.2008 Ⓑ 0.0998 Ⓒ 0.9108 Ⓓ 0.2708 Ⓔ 0.2408

14. What is the standard deviation of the average number of defects on products of the production line?

    Ⓐ 1.05 Ⓑ 0.0999 Ⓒ 1.07 Ⓓ 0.69 Ⓔ 0.89

15. Select 10 products of the production line randomly. Calculate the probability that there are at most 2 defective products.

    Ⓐ 0.8382 Ⓑ 0.7582 Ⓒ 0.9382 Ⓓ 0.6882 Ⓔ 0.8182

16. Suppose further that the number of defective products of the production line per hour also follows a Poisson distribution with an average of 1 defective productions per hour. Calculate the probability that the time beween two consecutive defective items does not exceed 24 minutes.

    Ⓐ 0.8197 Ⓑ 0.2797 Ⓒ 0.3297 Ⓓ 0.5897 Ⓔ 0.4597

Questions 17 through 20. Jermaine uses his smartphone X minutes everyday where X is a random variable following a normal distribution with a mean of 120 minutes and a standard deviation of 14 minutes.

17. Find the probability that Jermaine uses his smartphone less than 130 minutes in one day.

    Ⓐ 0.3181 Ⓑ 0.8736 Ⓒ 0.9847 Ⓓ 0.5403 Ⓔ 0.7625

18. Determine an interval centered at 120 such that X takes values in that interval in 83% days.

    Ⓐ (100.82, 139.18) Ⓑ (108, 132) Ⓒ (104, 136) Ⓓ (82, 158) Ⓔ (113, 127)

19. Compute the probability that there are at least three days of a week (7 days) in which Jermaine uses his smartphone more than 130 minutes per day.

    (A) 0.0476 (B) 0.2181 (C) 0.1576 (D) 0.3776 (E) 0.7076

20. Find the probability that, on average, Jermaine uses his smartphone less than 130 minutes per day in a week. (A) 0.4151 (B) 0.9706 (C) 0.8551 (D) 0.9101 (E) 0.7451

Lecturer: Dr. Nguyen Tien Dung	*Date* *October 6^{th}, 2023*	**Approved by:**	*Date* *October 6^{th}, 2023*

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UNIVERSITY OF TECHNOLOGY - VNUHCM Faculty of Applied Science	**Midterm Exam**	Academic year	2023-2024	Semester	1
		Exam date	October 16^{th}, 2023		
	Course title	Probability and Statistics			**Score**
	Course ID	MT2013	Sheet code	**2317**	
	Duration	50 minutes	Shift	7:00	

Instructions to students:

- *You are allowed to use your OWN materials and calculator. Total available score: 10.*
- *At the beginning of the working time, you MUST fill in your full name and student ID on this question sheet. There are 20 questions on 3 pages.*
- *Do not round between steps. Round your final answers to 4 decimal places.*

Student's full name:	Invigilator 1: . . . .
Student Id: . . . . Group:	Invigilator 2: . . . .

1. Let A and B be two events such that $P(A) = 0.5$ and $P(A \cap B) = 0.44$. Find the probability $P(B)$ such that A and B are independent.

   (A) 0.72 (B) 0.48 (C) 0.75 (D) 0.47 (E) 0.88

2. Suppose that the probability for you to win 453 dollars in a game is 18%, while the probability of losing 32 dollars is 82%. Compute your average net gain in a game.

   (A) Lose 61.3 dollars. (B) Win 58.3 dollars. (C) Lose 64.3 dollars. (D) Win 59.3 dollars. (E) Win 55.3 dollars.

3. Consider three events A, B, and C in the sample space Ω such that $P(A) = 0.14$, $P(B) = 0.2$, $P(C) = 0.21$, and $P(B|C) = 0.12$. Suppose that A and B are independent. In addition, A and C are disjoint. Compute $P(A \cup B \cup C)$.

   (A) 0.1368 (B) 0.0768 (C) 0.4968 (D) 0.3668 (E) 0.6768

4. Which of the following functions is the probability density function of random variable? Assume that these functions are zero outside the given interval.

   (A) $f(x) = 3x^2,\ 0 \leq x \leq 1/3$ (B) $f(x) = 2e^{2x},\ 0 \leq x \leq 1$ (C) $f(x) = 4x - 1,\ 0 \leq x \leq 1$ (D) $f(x) = 2\cos 2x,\ \pi/2 \leq x \leq 3\pi/4$ (E) $f(x) = 2\sin 2x,\ 0 \leq x \leq \pi/4$

Questions 5 through 8. The diameter of a molecule (in micrometer) is a random varible with the following probability density function

$$f(x) = \begin{cases} \dfrac{10k}{(x-8)^2}, & \text{if } 0 \leq x \leq 2 \\ 0 & , \text{ otherwise} \end{cases}$$

5. Determine the constant k. (A) 2.4 (B) 1.9445 (C) 2.7445 (D) 2.2445 (E) 2.0445

6. Find the value of the cumulative distribution function at 0.9.

   (A) 0.9248 (B) 0.7248 (C) 0.2248 (D) 0.4248 (E) 0.3803

7. Put $Y = 4X + 8$. What is the mean of Y?

   (A) 12.3825 (B) 12.427 (C) 11.827 (D) 12.827 (E) 12.027

8. Find the median of the diameter of a molecule.

   Ⓐ 0.8874 Ⓑ 0.6874 Ⓒ 1.2874 Ⓓ 1.1429 Ⓔ 1.5874

Questions 9 through 12. There are three methods to conduct an experiment and the probabilities of success for these methods are 0.7, 0.7, and 0.9 respectively. One student randomly selects a method and use it to carry on the experiment two times independently. Denote by X the number of successes.

9. Find the probability that the first methods is selected and fails twice.

   Ⓐ 0.03 Ⓑ 0.13 Ⓒ 0.21 Ⓓ 0.28 Ⓔ 0.5

10. Find the probability that there is exactly one failure.

    Ⓐ 0.61 Ⓑ 0.69 Ⓒ 0.01 Ⓓ 0.62 Ⓔ 0.34

11. What is the mean of X?

    Ⓐ 1.5333 Ⓑ 1.9333 Ⓒ 1.5133 Ⓓ 1.5833 Ⓔ 2.0733

12. Suppose that each failure costs the student 2 dollars. Compute the variance of the failure cost.

    Ⓐ 1.5022 Ⓑ 1.5222 Ⓒ 1.1522 Ⓓ 1.2822 Ⓔ 1.0822

Questions 13 through 16. Assume that the number of defects on a product of a production line is a random variable following a Poisson distribution and the numbers are independent across products. A product with at least one defect will be classified as a defective product. Assume further that the percentage of defective products made by this production line is 0.115.

13. Compute the average number of defects on a product of this production line.

    Ⓐ 0.7332 Ⓑ 0.1222 Ⓒ 1.0732 Ⓓ 0.6732 Ⓔ 0.9532

14. What is the standard deviation of the average number of defects on products of the production line?

    Ⓐ 0.6503 Ⓑ 0.3803 Ⓒ 0.0303 Ⓓ 0.00029999999999999 Ⓔ 0.0802

15. Select 19 products of the production line randomly. Calculate the probability that there are at most 2 defective products.

    Ⓐ 0.2639 Ⓑ 0.4939 Ⓒ 0.6239 Ⓓ 0.4139 Ⓔ 0.3339

16. Suppose further that the number of defective products of the production line per hour also follows a Poisson distribution with an average of 5 defective productions per hour. Calculate the probability that the time beween two consecutive defective items does not exceed 42 minutes.

    Ⓐ 0.6798 Ⓑ 0.5898 Ⓒ 0.9498 Ⓓ 0.9698 Ⓔ 0.5498

Questions 17 through 20. Kele uses his smartphone X minutes everyday where X is a random variable following a normal distribution with a mean of 90 minutes and a standard deviation of 16 minutes.

17. Find the probability that Kele uses his smartphone less than 121 minutes in one day.

    Ⓐ 0.4182 Ⓑ 0.5293 Ⓒ 0.9737 Ⓓ 0.8626 Ⓔ 0.7515

18. Determine an interval centered at 90 such that X takes values in that interval in 92% days.

    Ⓐ (43, 137) Ⓑ (62, 118) Ⓒ (50, 130) Ⓓ (81, 99) Ⓔ (72, 108)

19. Compute the probability that there are at least three days of a week (7 days) in which Kele uses his smartphone more than 121 minutes per day.

    (A) 0.2151 (B) 0.4901 (C) 0.0006 (D) 0.4351 (E) 0.1051

20. Find the probability that, on average, Kele uses his smartphone less than 121 minutes per day in a week. (A) 0.7195 (B) 1 (C) 0.8295 (D) 0.6095 (E) 0.8845

Lecturer: Dr. Nguyen Tien Dung	*Date* *October 6th, 2023*	**Approved by:**	*Date* *October 6th, 2023*

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UNIVERSITY OF TECHNOLOGY - VNUHCM Faculty of Applied Science	**Midterm Exam**		Academic year	2023-2024	Semester	1
			Exam date	October 16th, 2023		
	Course title	Probability and Statistics			**Score**	
	Course ID	MT2013	Sheet code	**2318**		
	Duration	50 minutes	Shift	7:00		

Instructions to students:

- *You are allowed to use your OWN materials and calculator. Total available score: 10.*
- *At the beginning of the working time, you MUST fill in your full name and student ID on this question sheet. There are 20 questions on 3 pages.*
- *Do not round between steps. Round your final answers to 4 decimal places.*

Student's full name: . . . . Invigilator 1: . . . .

Student Id: . . . . Group: . . . . Invigilator 2: . . . .

1. Let A and B be two events such that $P(A) = 0.48$ and $P(A\cap B) = 0.25$. Find the probability $P(B)$ such that A and B are independent.

   (A) 0.9908 (B) 0.0408 (C) 0.8208 (D) 0.6808 (E) 0.5208

2. Suppose that the probability for you to win 259 dollars in a game is 32%, while the probability of losing 30 dollars is 68%. Compute your average net gain in a game.

   (A) Lose 72.48 dollars. (B) Lose 69.48 dollars. (C) Win 67.48 dollars. (D) Win 72.48 dollars. (E) Win 62.48 dollars.

3. Consider three events A, B, and C in the sample space Ω such that $P(A) = 0.27$, $P(B) = 0.18$, $P(C) = 0.29$, and $P(A|C) = 0.17$. Suppose that A and B are independent. In addition, B and C are disjoint. Compute $P(A\cup B\cup C)$.

   (A) 0.2921 (B) 0.9221 (C) 0.5321 (D) 0.6421 (E) 0.9521

4. Which of the following functions is the probability density function of random variable? Assume that these functions are zero outside the given interval.

   (A) $f(x) = 3x^2,\ 0 \le x \le 1/3$ (B) $f(x) = 2e^{2x},\ 0 \le x \le 1$ (C) $f(x) = 2\cos 2x,\ \pi/2 \le x \le 3\pi/4$ (D) $f(x) = 2\sin 2x,\ 0 \le x \le \pi/4$ (E) $f(x) = 4x - 1,\ 0 \le x \le 1$

Questions 5 through 8. The diameter of a molecule (in micrometer) is a random varible with the following probability density function

$$f(x) = \begin{cases} \dfrac{8k}{(x-4)^2}, & \text{if } 0 \le x \le 2 \\ 0 & , \text{ otherwise} \end{cases}$$

5. Determine the constant k. (A) 0.0445 (B) 1.0445 (C) 0.9445 (D) 0.5 (E) 0.5445

6. Find the value of the cumulative distribution function at 1.8.

   (A) 0.8182 (B) 0.9627 (C) 0.6627 (D) 0.2627 (E) 0.4627

7. Put $Y = 6X + 8$. What is the mean of Y?

   (A) 15.3645 (B) 15.609 (C) 15.509 (D) 14.909 (E) 15.409

8. Find the median of the diameter of a molecule.

   Ⓐ 0.7778 Ⓑ 0.9778 Ⓒ 1.3333 Ⓓ 1.7778 Ⓔ 1.3778

Questions 9 through 12. There are three methods to conduct an experiment and the probabilities of success for these methods are 0.75, 0.65, and 0.6 respectively. One student randomly selects a method and use it to carry on the experiment two times independently. Denote by X the number of successes.

9. Find the probability that the first methods is selected and fails twice.

   Ⓐ 0.1208 Ⓑ 0.2608 Ⓒ 0.3208 Ⓓ 0.0208 Ⓔ 0.5508

10. Find the probability that there is exactly one failure.

    Ⓐ 0.4567 Ⓑ 0.8567 Ⓒ 0.3867 Ⓓ 0.4367 Ⓔ 0.7767

11. What is the mean of X?

    Ⓐ 1.4833 Ⓑ 1.7033 Ⓒ 1.0933 Ⓓ 1.3333 Ⓔ 1.4333

12. Suppose that each failure costs the student 1.5 dollars. Compute the variance of the failure cost.

    Ⓐ 1.3675 Ⓑ 0.8575 Ⓒ 1.0175 Ⓓ 0.6075 Ⓔ 1.5575

Questions 13 through 16. Assume that the number of defects on a product of a production line is a random variable following a Poisson distribution and the numbers are independent across products. A product with at least one defect will be classified as a defective product. Assume further that the percentage of defective products made by this production line is 0.105.

13. Compute the average number of defects on a product of this production line.

    Ⓐ 0.1109 Ⓑ 0.3919 Ⓒ 1.1019 Ⓓ 0.2319 Ⓔ 1.0019

14. What is the standard deviation of the average number of defects on products of the production line?

    Ⓐ 0.0745 Ⓑ 0.9146 Ⓒ 0.0646 Ⓓ 0.5946 Ⓔ 0.8746

15. Select 20 products of the production line randomly. Calculate the probability that there are at most 2 defective products.

    Ⓐ 0.6484 Ⓑ 0.1884 Ⓒ 0.5984 Ⓓ 0.4684 Ⓔ 0.2084

16. Suppose further that the number of defective products of the production line per hour also follows a Poisson distribution with an average of 1 defective productions per hour. Calculate the probability that the time beween two consecutive defective items does not exceed 40 minutes.

    Ⓐ 0.7366 Ⓑ 0.2366 Ⓒ 0.6766 Ⓓ 0.4866 Ⓔ 0.3466

Questions 17 through 20. Kyrie uses his smartphone X minutes everyday where X is a random variable following a normal distribution with a mean of 116 minutes and a standard deviation of 19 minutes.

17. Find the probability that Kyrie uses his smartphone less than 149.1 minutes in one day.

    Ⓐ 0.9593 Ⓑ 0.626 Ⓒ 0.8482 Ⓓ 0.4038 Ⓔ 0.5149

18. Determine an interval centered at 116 such that X takes values in that interval in 91% days.

    Ⓐ (65, 167) Ⓑ (77, 155) Ⓒ (104, 128) Ⓓ (83.7, 148.3) Ⓔ (95, 137)

19. Compute the probability that there are at least three days of a week (7 days) in which Kyrie uses his smartphone more than 149.1 minutes per day.

    (A) 0.3266 (B) 0.1066 (C) 0.5466 (D) 0.4366 (E) 0.0021

20. Find the probability that, on average, Kyrie uses his smartphone less than 149.1 minutes per day in a week. (A) 1 (B) 0.8295 (C) 0.4995 (D) 0.4445 (E) 0.8845

Answers Sheet

Question sheet code 2311:
1 B. 2 E. 3 A. 4 E. 5 E. 6 C. 7 C. 8 D. 9 D. 10 B. 11 B.
12 B. 13 B. 14 E. 15 C. 16 D. 17 E. 18 C. 19 B. 20 D.

Question sheet code 2312:
1 E. 2 C. 3 C. 4 C. 5 E. 6 E. 7 E. 8 B. 9 A. 10 D. 11 C.
12 E. 13 A. 14 B. 15 C. 16 E. 17 B. 18 E. 19 C. 20 E.

Question sheet code 2313:
1 A. 2 B. 3 D. 4 E. 5 D. 6 A. 7 D. 8 B. 9 C. 10 A. 11 A.
12 B. 13 E. 14 B. 15 E. 16 C. 17 D. 18 A. 19 C. 20 A.

Question sheet code 2314:
1 D. 2 B. 3 E. 4 B. 5 C. 6 B. 7 D. 8 A. 9 D. 10 C. 11 B.
12 C. 13 C. 14 B. 15 B. 16 A. 17 A. 18 A. 19 A. 20 D.

Question sheet code 2315:
1 C. 2 D. 3 B. 4 E. 5 E. 6 E. 7 B. 8 D. 9 E. 10 A. 11 A.
12 A. 13 C. 14 D. 15 B. 16 D. 17 B. 18 C. 19 A. 20 D.

Question sheet code 2316:
1 E. 2 B. 3 E. 4 B. 5 E. 6 B. 7 A. 8 E. 9 D. 10 A. 11 B.
12 D. 13 B. 14 B. 15 C. 16 C. 17 E. 18 A. 19 B. 20 B.

Question sheet code 2317:
1 E. 2 E. 3 C. 4 E. 5 A. 6 E. 7 A. 8 D. 9 A. 10 E. 11 A.
12 A. 13 B. 14 E. 15 C. 16 D. 17 C. 18 B. 19 C. 20 B.

Question sheet code 2318:
1 E. 2 E. 3 D. 4 D. 5 D. 6 A. 7 A. 8 C. 9 D. 10 D. 11 D.
12 C. 13 A. 14 A. 15 A. 16 D. 17 A. 18 D. 19 E. 20 A.

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MT2013

Probability and Statistics

OISP

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