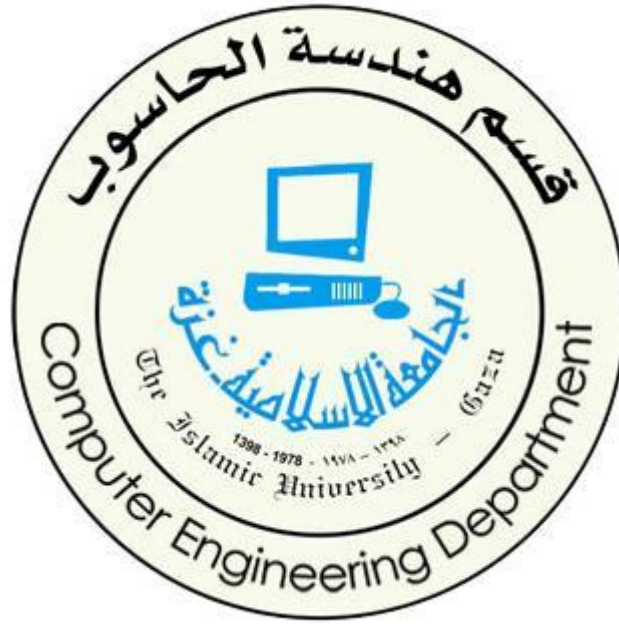




"Probability Theory & Statistics"

Final Exam 2025

"شكر خاص لكل المساهمين في الملف"

Prepared by:

Computer Engineering Group Team [2004]

<https://t.me/IUGComENG2004>



الامتحان كان عبارة عن أسئلة الكتاب المختارة اخر السلايدات لكل شابتر،
واسئلة الكويجات المتواجدة داخل الكتاب خلال الشرح.

لأسئلة نسخ لصق، الأفضل تشوف الأسئلة من الكتاب بدل ملف الأسئلة هذا

A student's test score T is an integer between 0 and 100 corresponding to the experimental outcomes $s_0, \dots, s_{100}$. A score of 90 to 100 is an A, 80 to 89 is a B, 70 to 79 is a C, 60 to 69 is a D, and below 60 is a failing grade of F. If all scores between 51 and 100 are equally likely and a score of 50 or less never occurs, find the following probabilities:

$P[T < 90]$

- ☐ 0:18
- ☐ 0:78
- ☐ 0.012
- ☐ 0.20
- ☐ 0.2

A candy package contains 12 individual candy pieces. Each piece is equally likely to be apple, orange, lemon, or cherry, independent of all other pieces.

What is the probability $P[F1]$ that all twelve pieces of your Starburst are the same flavor?

- ☐ 0.713
- ☐ 1/409
- ☐ 0.0317
- ☐ $2.384e-7$
- ☐ 0.0002441

The CDF of random variable W is

$$F_W(w) = \begin{cases} 0 & w < -5, \\ \frac{w+5}{8} & -5 \leq w < -3, \\ \frac{1}{4} & -3 \leq w < 3, \\ \frac{1}{4} + \frac{3(w-3)}{8} & 3 \leq w < 5, \\ 1 & w \geq 5. \end{cases}$$

What is $P[W > 0]$?

- ☐ 3/4
- ☐ 1/4
- ☐ 0
- ☐ 5/8
- ☐ 0.5

The peak temperature T as measured in degrees Fahrenheit, on a July day in New Jersey is the Gaussian (85, 10) random variable.

$P[70 \leq T \leq 100]$?

- ☐ 0.03085
- ☐ 0.3085
- ☐ 0.0668
- ☐ 0.866
- ☐ 0.803

You have a shuffled deck of three cards: 4, 5, and 6, and you deal out the three cards. Let E_i denote the event that i th card dealt is even numbered.

What is $P[E_2|E_1]$, the probability the second card is even given that the first card is even?

- ☐ 0.75
- ☐ 0.25
- ☐ 1
- ☐ 0
- ☐ 0.5

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الرئيسية

نظرية احتمالات وإحصاء

Question 3

Not yet answered

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Flag question

You have a shuffled deck of three cards: 4, 5, and 6, and you deal out the three cards. Let E_i denote the event that i th card dealt is even numbered.

What is $P[E_2|E_1]$, the probability the second card is even given that the first card is even?

- ☐ 0
- ☐ 1
- ☐ 0.25
- ☐ 0.75
- ☒ 0.5

الرئيسية

نظرية احتمالات وإحصاء

Question 5

Not yet answered

Marked out of 7

Flag question

To communicate one bit of information reliably, cellular phones transmit the same binary symbol five times. Thus the information "zero" is transmitted as 00000 and "one" is 11111. The receiver detects the correct information if three or more binary symbols are received correctly. What is the information error probability $P[E]$, if the binary symbol error probability is $q = 0.1$?

- ☐ 0.0856
- ☐ 0.00658
- ☒ 0.00856
- ☐ 0.056
- ☐ 0.23

Question 7

Not yet answered

Marked out of 8

Flag question

Random variable X has PDF

$$f_X(x) = \begin{cases} 1/4 & -1 \leq x \leq 3, \\ 0 & \text{otherwise.} \end{cases}$$

Define the random variable Y by $Y = h(X) = X^2$.

Find $h(E[X])$

- ☐ 4/3
- ☐ 6.756
- ☐ 7/3
- ☐ 2/3
- ☒ 1

الرئيسية

نظرية احتمالات وإحصاء

Question 2

Not yet answered
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Flag question

The number of buses that arrive at a bus stop in T minutes is a Poisson random variable B with expected value $T/5$.

How much time should you allow so that with probability 0.99 at least one bus arrives?

- ☐ 15 min
- ☐ 27 min
- ☐ 23 hours
- ☒ 23 min
- ☐ 10 min

الصفحة التالية

الرئيسية

نظرية احتمالات وإحصاء

Question 1

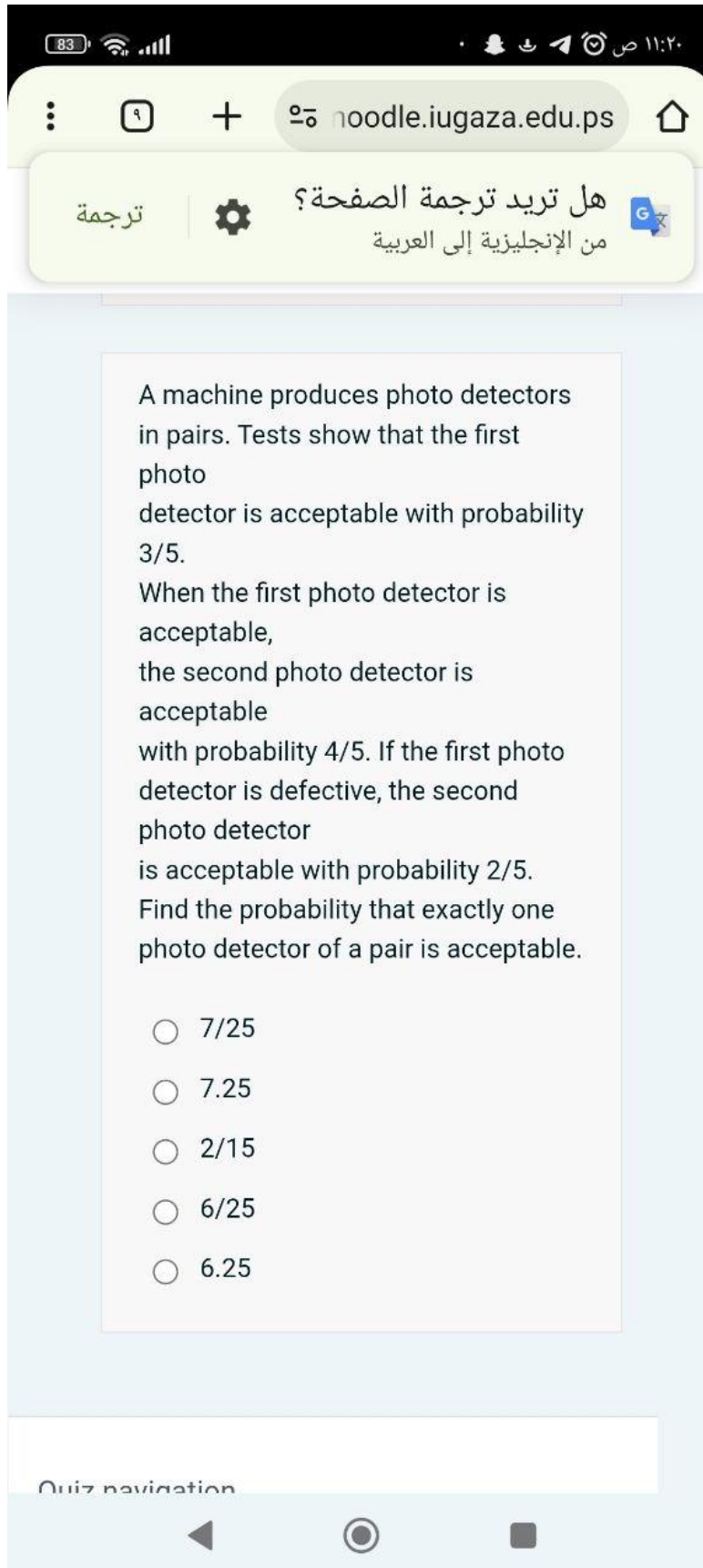
Not yet answered
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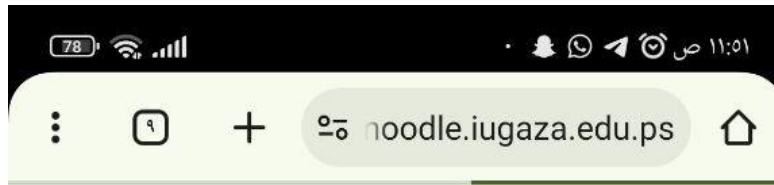
Flag question

A student's test score T is an integer between 0 and 100 corresponding to the experimental outcomes $s_0, \dots, s_{100}$. A score of 90 to 100 is an A, 80 to 89 is a B, 70 to 79 is a C, 60 to 69 is a D, and below 60 is a failing grade of F. If all scores between 51 and 100 are equally likely and a score of 50 or less never occurs, find the following probabilities:

$P[F]$

- ☐ 0.02
- ☒ 0.18
- ☐ 0.20
- ☐ 0.012
- ☐ 0.2





نظرية احتمالات وإحصاء

Question 6

Not yet answered

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Flag question

The peak temperature T as measured in degrees Fahrenheit, on a July day in New Jersey is the Gaussian $(85, 10)$ random variable.

$P[70 \leq T \leq 100]$?

- ☐ 0.03085
- ☐ 0.0668
- ☐ 0.803
- ☐ 0.3085
- ☐ 0.866

Finish attempt ...



Question 1

Not yet answered

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Flag question

A student's test score T is an integer between 0 and 100 corresponding to the experimental outcomes $s_0, \dots, s_{100}$. A score of 90 to 100 is an A, 80 to 89 is a B, 70 to 79 is a C, 60 to 69 is a D, and below 60 is a failing grade of F. If all scores between 51 and 100 are equally likely and a score of 50 or less never occurs, find the following probabilities:

$P[\text{C or better}]$

- ☐ 0.2
- ☐ 0.78
- ☐ 0.20
- ☐ 0.62
- ☐ 0.18

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الرئيسية

Question 2
Not yet answered
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Flag question

The random variable Y has a PMF

$$P_Y(y) = \begin{cases} 1/11 & y = 5, 6, 7, \dots, 15 \\ 0 & \text{otherwise} \end{cases}$$

Find $P[Y > 12]$?

☐ 4/11
☐ 5/11

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الرئيسية

Question 4
Not yet answered
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Flag question

Random variable X has PDF

$$f_X(x) = \begin{cases} 1/4 & -1 \leq x \leq 3, \\ 0 & \text{otherwise.} \end{cases}$$

Define the random variable Y by $Y = h(X) = X^2$.
Find $\text{Var}[Y]$.

☐ 4/3

80

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من الإنجليزية إلى العربية

ترجمة

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Flag question

Consider a binary code with 5 bits (0 or 1) in each code word. An example of a code word is 01010. In each code word a bit is a zero with probability 0.6, independent of any other bit.

What is the probability that a code word contains exactly two ones?

☐ 0.5

☐ 0.02304

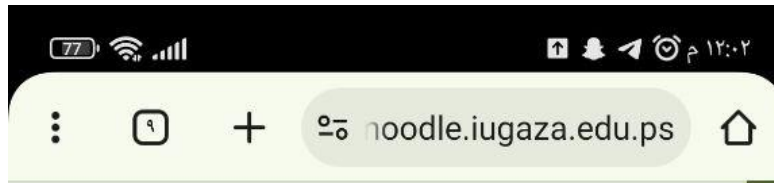
☐ 0.03456

☐ 0

☐ 0.3456

الصفحة التالية

Quiz navigation



Question **6**

Not yet answered

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Flag question

The peak temperature T as measured in degrees Fahrenheit, on a July day in New Jersey is the Gaussian $(85, 10)$ random variable.

$P[70 \leq T \leq 100]$?

- ☐ 0.03085
- ☐ 0.0668
- ☐ 0.803
- ☐ 0.3085
- ☒ 0.866

الصفحة التالية

Quiz navigation

between 0 and 100 corresponding to the experimental outcomes $s_0, \dots, s_{100}$. A score of 90 to 100 is an A, 80 to 89 is a B, 70 to 79 is a C, 60 to 69 is a D, and below 60 is a failing grade of F. If all scores between 51 and 100 are equally likely and a score of 50 or less never occurs, find the following probabilities:

$P\{s_{100}\}$

- ☐ 0.012
- ☐ 0.002
- ☒ 0.02
- ☐ 0.2
- ☐ 0.20

الصفحة التالية

Quiz navigation



Marked out of 10

🚩 Flag question

You have a shuffled deck of three cards: 4, 5, and 6, and you deal out the three cards. Let E_i denote the event that i th card dealt is even numbered.

What is the conditional probability that the second card is odd given that the first card is odd?

- ☐ 0.25
- ☐ 0.5
- ☐ 1
- ☒ 0
- ☐ 0.75

الصفحة التالية

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نظرية احتمالات وإحصاء

Question 4

Not yet answered

Marked out of 8

Flag question

The random variable X has PMF

$$P_X(x) = \begin{cases} c/x & x = 2, 3, 4, 5, 6, 7 \\ 0 & \text{other} \end{cases}$$

$c = 8/7$

What is $P[X = 4]$?

- ☐ 2/3
- ☐ 4/7
- ☐ 3/7
- ☒ 2/7
- ☐ 0.4

الصفحة التالية



Not yet answered

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🚩 Flag question

The number of buses that arrive at a bus stop in T minutes is a Poisson random variable B with expected value $T/5$.

What is the probability that in a three minutes interval, two buses will arrive?

- ☐ 0.89
- ☐ 0.0099
- ☐ 0.368
- ☒ 0.0988
- ☐ 0.98

الصفحة التالية

Quiz navigation



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الرئيسية

Question 4

Not yet answered

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Flag question

The random variable X has PMF

$$P_X(x) = \begin{cases} c/x & x = 2, 4, 8, \\ 0 & \text{otherwise.} \end{cases}$$

c = 8/7

What is P[X = 4]?

☐ 2/3

A candy package contains 12 individual candy pieces. Each piece is equally likely to be apple, orange, lemon, or cherry, independent of all other pieces.

What is the probability that the package has no cherry pieces?

- ☐ 1/409
- ☐ 1/2326
- ☒ 0:0317
- ☐ 0.713
- ☐ 0.0002441

الصفحة التالية

Quiz navigation



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Flag question

The CDF of random variable W is

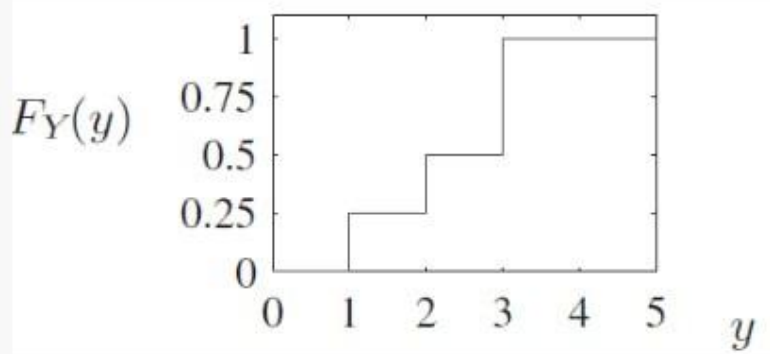
$$F_W(w) = \begin{cases} 0 \\ \frac{w+5}{8} \\ \frac{1}{4} \\ \frac{1}{4} + \frac{3(w-3)}{8} \\ 1 \end{cases}$$

What is $P[W > 0]$?

- ☐ 5/8
- ☐ 0
- ☐ 0.5
- ☐ 1/4
- ☒ 3/4

الصفحة التالية

Discrete random variable Y has the CDF $F_Y(y)$ as shown:



Use the CDF to find $P[Y \geq 2]$

- ☐ 0
- ☐ 0.5
- ☐ 0.25
- ☐ 0.3
- ☒ 0.75

A packet received by your smartphone is error-free with probability 0.9, independent of any other packet.

In one hour, your smartphone receives 12,000 packets. Let X equal the number of packets received with errors. What is $E[X]$?

- ☒ 1200 errors per hour
- ☐ 1200 errors per minutes
- ☐ 120 errors per hour
- ☐ 1300 errors per hour
- ☐ 120 errors per minutes

A machine produces photo detectors in pairs. Tests show that the first photo detector is acceptable with probability $3/5$. When the first photo detector is acceptable, the second photo detector is acceptable with probability $4/5$. If the first photo detector is defective, the second photo detector is acceptable with probability $2/5$. Find the probability that exactly one photo detector of a pair is acceptable.

- ☐ $2/15$
- ☐ 7.25
- ☒ $7/25$
- ☐ $6/25$
- ☐ 6.25

Question 5

Not yet answered

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Flag question

Mobile telephones perform handoffs as they move from cell to cell. During a call, a telephone either performs zero handoffs (H_0), one handoff (H_1), or more than one handoff (H_2). In addition, each call is either long (L), if it lasts more than three minutes, or brief (B). The following table describes the probabilities of the possible types of calls.

	H_0	H_1	H_2
L	0.1	0.1	0.2
B	0.4	0.1	0.1

What is the probability that a long call will have no handoffs?

- ☐ 0.8
- ☐ 0.75
- ☐ 0.5
- ☐ 0.2
- ☒ 0.25

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$P[A]$

- ☐ 0.2
- ☐ 0.002
- ☐ 0.12
- ☐ 0.02
- ☒ 0.22

Question 1

Not yet answered

Marked out of 8

Flag question

Random variable X has PDF

$$f_X(x) = \begin{cases} 1/4 & -1 \leq x \leq 3, \\ 0 & \text{otherwise.} \end{cases}$$

Define the random variable Y by $Y = h(X) = X^2$.

Find $h(E[X])$

- ☐ 2/3
- ☐ 7/3
- ☐ 6.756
- ☐ 4/3
- ☒ 1