Exam 1

Due Mar 3 at 11:59pm   **Points** 35   **Questions** 35

Available Mar 2 at 11:59pm - Mar 3 at 11:59pm 1 day   **Time Limit** 120 Minutes

Instructions

exam1.pdf ⤓ **(https://canvas.iastate.edu/courses/79674/files/14570932/download?download_frd=1)**

exam1_key.pdf ⤓ **(https://canvas.iastate.edu/courses/79674/files/14570935/download?download_frd=1)**

Timing

The exam will be available at midnight on the evening of March 2nd and close at midnight on the evening of March 3rd. Once started, you have 2 hours to complete this exam.

Resources

You are allowed to use any resource **excluding** aid from another individual. This exclusion includes posting questions on a website or service.

Numerical answers

Many of the questions require a numerical answer. For decimal answers, please answer to 3 decimal places. For numerical answers that are probabilities, make sure to use the decimal and not the percentage, e.g. use 0.025 not 2.5%.

Asking questions

I will not be responding to questions as it could unfairly disadvantage students who have already completed the exam. If there is an issue with the exam, we will just have to deal with it after the exam.

This quiz was locked Mar 3 at 11:59pm.

Attempt History

	Attempt	**Time**	**Score**
LATEST	[Attempt 1](#)	113 minutes	30 out of 35

Score for this quiz: **30** out of 35
Submitted Mar 3 at 2:52pm
This attempt took 113 minutes.

Question 1   1 / 1 pts

I have not and will not provide aid from or to another individual for this exam. I have not and will not post any question related to this exam on any website before March 5, 2021.

Correct!

◉ True

○ False

Question 2   1 / 1 pts

A combination lock has 3 dials each containing the numbers 0 to 9. How many different combinations are there?

Correct!

1,000

orrect Answers   1,000 (with margin: 0.5)

Question 3   1 / 1 pts

A game of pool contains 15 balls numbered from 1 to 15 and the goal is to knock these balls into the pockets of the pool table. How many different orders are there for knocking all 15 balls into the pockets? (Do not use any rules you know about pool.)

- ○ 15 choose 1

- ○ 1!/15!

- ○ 15^1

- ○ 1^15

Correct!   ◉ 15!

- ○ 15!/(15-1)!

- ○ 1 choose 15

Question 4   1 / 1 pts

How many different passwords are there that are 8 digits long and only contain lowercase letters?

- ○ 8^26

○ 8 choose 26

○ 26 choose 8

○ 26!/8!

Correct! ● 26^8

○ 26!/(26-8)!

For the following questions, consider an experiment where two 4-sided dice are rolled?

Question 5   1 / 1 pts

What is the probability the sum of the two dice is less than or equal to 5?

Correct!
0.625

orrect Answers   0.625 (with margin: 0.01)

Question 6   1 / 1 pts

What is the sample space for this experiment?

Correct!

◉ {11,12,13,14,21,22,23,24,31,32,33,34,41,42,43,44}

○ {HH,HT,TH,TT}

○ {1,2,3,4}

○ {1,2,3,4,5,6,7,8,9,10,11,12}

Question 7   1 / 1 pts

What is the probability at least one of the dice is an even number?

Correct!

0.75

orrect Answers   0.75 (with margin: 0.01)

For the following reliability questions, assume the reliability of component A is 0.9, component B is 0.8, and component C is 0.7.

Question 8   1 / 1 pts

What is the reliability of a system that has components B and C in serial?
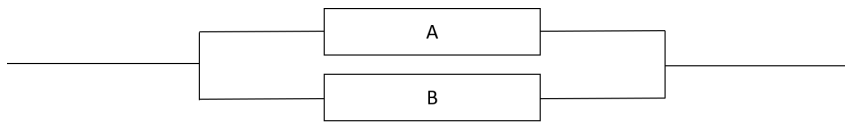
B —— C

Correct!

> 0.56

orrect Answers   0.56 (with margin: 0.01)

Question 9   1 / 1 pts

What is the reliability of a system that has components A and B in parallel?
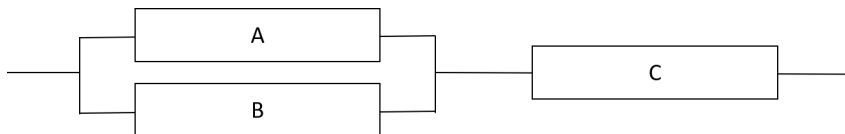

Correct!

> 0.98

orrect Answers   0.98 (with margin: 0.005)

Question 10   1 / 1 pts

What is the reliability of a system that has components A and B in parallel and this A-B sub-system is serial with component C?

Correct!

> 0.686

orrect Answers   0.686 (with margin: 0.01)

In Candy Crush, players can use boosters to help defeat levels. For a particular level, the following table provides the joint probability of players beating the level and the number of boosters used. Answer the following questions based on this table.

Beat level	0 Boosters	1 Booster	2 Boosters
Yes	0.00	0.20	0.50
No	??	0.10	0.05

Question 11   1 / 1 pts

Are "the number of boosters used" and "whether or not the player beats the level" independent?

○ yes

Correct!   ◉ no

○ cannot determine

Question 12   0 / 1 pts

What is the probability that a player uses no boosters and does not beat the level?

ou Answered

0.85

orrect Answers   0.15 (with margin: 0.01)

Question 13   1 / 1 pts

What is the probability that a player uses 2 boosters and beats the level?

Correct!

0.5

orrect Answers   0.5 (with margin: 0.01)

For the following question, remember that

- sensitivity is the probability of testing positive if you have the disease
- specificity is the probability of testing negative if you don't have the disease
- prevalence is the probability of having the disease before the test

Question 14   1 / 1 pts

Suppose a diagnostic test has a sensitivity of 0.99 and a specificity of 0.95. The disease being tested for has an overall prevalence of 0.1. If a test results comes back positive, what is the probability the individual has the disease?

Correct!

> 0.688

rrect Answers   0.6875 (with margin: 0.01)

For the following questions, assume X ~ Bern(1/3).

Question 15   1 / 1 pts

Determine E(X).

Correct!

> 0.333

rrect Answers   0.3333 (with margin: 0.01)

Question 16   1 / 1 pts

Determine Var(X).

Correct!

0.222

orrect Answers   0.2222 (with margin: 0.01)

Question 17   1 / 1 pts

What is the P(X=0)?

Correct!

0.667

orrect Answers   0.6667 (with margin: 0.01)

For the following questions, assume Y ~ Binom(16,0.4).

Question 18   1 / 1 pts

Determine E(Y).

Correct!

6.4

rrect Answers	6.4 (with margin: 0.1)

Question 19   1 / 1 pts

Determine P(Y = 4).

Correct!

> 0.101

rrect Answers   0.1014 (with margin: 0.01)

Question 20   1 / 1 pts

Determine P(Y <= 10).

Correct!

> 0.981

rrect Answers   0.9809 (with margin: 0.01)

For the following questions assume X ~ Geo(0.8).

Question 21   0 / 1 pts

Determine P(X=1).

0.16

orrect Answers   0.8 (with margin: 0.01)

Question 22   1 / 1 pts

Determine Var(X).

Correct!

0.313

orrect Answers   0.3125 (with margin: 0.01)

Question 23   1 / 1 pts

Determine E(X).

Correct!

1.25

orrect Answers   1.25 (with margin: 0.1)

For the following questions, assume Y ~ Pois(5).

Question 24   1 / 1 pts

Determine Var(Y).

Correct!

> 5

orrect Answers   5 (with margin: 0.1)

Question 25   1 / 1 pts

Determine E(Y).

Correct!

> 5

orrect Answers   5 (with margin: 0.1)

Question 26   1 / 1 pts

Determine P(Y=3).

Correct!

> 0.14

orrect Answers   0.1404 (with margin: 0.01)

For the following questions, suppose you roll a fair 20-sided die 2 times and you win if at least one of the two rolls is a 20.

Question 27

0 / 1 pts

What is the expected number of 20s?

ou Answered

0.195

orrect Answers   0.1 (with margin: 0.01)

Question 28

0 / 1 pts

What is the variance in the expected number of 20s?

ou Answered

0.176

orrect Answers   0.095 (with margin: 0.01)

Question 29

1 / 1 pts

What is the probability you win?

Correct!

| 0.097 |

rrect Answers   0.0975 (with margin: 0.01)

For the following questions, assume a particular website has 15 visitors per hour and assume each hour is independent of all other hours.

Question 30   1 / 1 pts

What is the expected number of visitors in the next hour?

Correct!

| 15 |

rrect Answers   15 (with margin: 0.1)

Question 31   1 / 1 pts

What is the probability there will be exactly 13 visitors in the next hour?

Correct!

| 0.096 |

rrect Answers   0.0956 (with margin: 0.01)

Question 32

1 / 1 pts

What is the variance of the number of visitors in the next hour?

Correct!

15

orrect Answers

15 (with margin: 0.1)

For the following questions, consider the following scenario. In Minecraft, you can trade with Piglins to obtain Ender Pearls. You continue trading with a Piglin until you obtain one Ender Pearl. Assume the probability of obtaining an Ender Pearl is 5%.

Question 33

1 / 1 pts

What is the expected number of trades when you receive your first Ender Pearl?

Correct!

20

orrect Answers

20 (with margin: 0.1)

Question 34   0 / 1 pts

What is the probability you will have to trade more than 30 times before you get your first Ender Pearl?

ou Answered

> 0.204

orrect Answers   0.2146 (with margin: 0.01)

Question 35   1 / 1 pts

What is the probability you get the Ender Pearl on your first trade?

Correct!

> 0.048

orrect Answers   0.05 (with margin: 0.01)

Quiz Score: **30** out of 35