Attempt History

	Attempt	Time	Score
LATEST	Attempt 1	117 minutes	82 out of 100

Score for this quiz: **82** out of 100
Submitted Feb 18 at 7:01am
This attempt took 117 minutes.

Question 1

3 / 3 pts

There are 6 random people in a room. What is the probability that none of them share the same birthday? (Assume 365 days are equally likely.)

- 0.901
- 0.943
- Correct! 0.960
- 0.973
- 0.989

Question 2

3 / 3 pts

Consider a family that has 4 children. Assume that $\Pr(\text{kid is a boy}) = \Pr(\text{kid is a girl}) = 1/2$, and that the genders of the 4 kids are independent. What is the probability that all 4 kids are boys given that we know at least 3 of them are boys?

- $1/16$
- $1/8$

Correct!

- $1/5$
- $1/4$
- $1/2$

Question 3

3 / 3 pts

TRUE or FALSE? Randomly select one card from a standard deck of 52 cards. Suppose we define the event A to be that the selected card is a Diamond, and the event B is that the selected card is a Spade. Then A and B are independent.

Note: A standard deck of playing cards contains a total of 52 cards of 4 types: 13 each of Spades, Clubs, Hearts, and Diamonds.

- True

Correct!

- False

Question 4

3 / 3 pts

TRUE or FALSE? The function $F(x) = 1 - (1/5)e^{-x/5}$ for $x \geq 0$ is a valid c.d.f.

- True
- Correct! False

Question 5

3 / 3 pts

If the random variable X has p.d.f. $f(x) = 2(1-x)$, for $0 \leq x \leq 1$, what is the distribution of the slightly nasty random variable $2X - X^2$?

- Triangular
- Gamma
- Exponential
- Normal
- Correct! Uniform

Question 6

3 / 3 pts

Consider the discrete random variable X such that

$$P(X = x) = \begin{cases} 0.5, & \text{if } x = -2 \\ 0.2, & \text{if } x = 0.2 \\ 0.3, & \text{if } x = 7 \\ 0, & \text{otherwise} \end{cases}$$

Use the discrete version of the Inverse Transform method from class and the $\text{Unif}(0, 1)$ pseudo-random number $U = 0.99$ to generate one observation X coming from this p.m.f.

- $X = -2$
- $X = 0.2$
- $X = 3$
- Correct! $X = 7$

Question 7

3 / 3 pts

Suppose that U and V are i.i.d. $\text{Unif}(0, 1)$ random variables. How would you simulate the sum of two 6-sided dice tosses?

- (a) $12U$
- (b) $\lceil 12U \rceil$
- (c) $\lceil 12V \rceil$

Correct!

- (d) $\lceil 6U \rceil + \lceil 6V \rceil$
- (e) Both (b) and (c)
- (f) None of the above

Question 8

3 / 3 pts

Suppose that $X \sim \text{Bern}(0.2)$. What is $\text{Var}[X^{3.5}]$?

- 0.2
- $(0.2)^{3.5}$
- 5
- $5^{3.5}$

Correct!

- $(0.2)(0.8)$

Question 9

3 / 3 pts

TRUE or FALSE? Let X denote the number of tails from two fair coin tosses. Then the probability mass function for $Y = X^2 - 1$ is

$$P(Y = y) = \begin{cases} 1/4, & \text{if } y = -1 \\ 1/2, & \text{if } y = 0 \\ 1/4, & \text{if } y = 3 \end{cases}$$

Correct!

- (●) True
- ( ) False

Question 10

3 / 3 pts

YES or NO? Suppose X and Y are random variables that have joint p.d.f.

$$f(x, y) = cx^2 \ell n(1 + y) \quad \text{for } 0 \leq x \leq 1 \text{ and } 0 \leq y \leq 1,$$

where c is the constant that makes this integrate to 1. Are X and Y independent?

Correct!

- (●) YES
- ( ) NO

Question 11

0 / 3 pts

Suppose X and Y are two random variables for which the joint probability density function is given by

$$f(x,y) = 6e^{-x-2y} \quad \text{for } 0 < x < y < \infty$$

What is the probability that $2Y > X$?

- 0
- 0.324
- You Answered — 0.623
- 0.915
- Correct Answer — 1

Question 12

3 / 3 pts

Suppose that X is a random variable with a mean of 6 and variance of 8; Y is a random variable with a mean of -10 and variance of 18; and $\mathrm{Cov}(X, Y) = -8$. Find $\mathrm{Corr}(X, Y)$.

- $-1/3$
- $-1/2$

Correct!

- $-2/3$
- $-3/4$
- $-4/5$

Question 13

3 / 3 pts

Given an exponential random variable $X \sim \mathrm{Exp}(\lambda = 1/180)$, what is the conditional probability $\mathrm{P}(\mathrm{X} > 100 | \mathrm{X} > 40)$?

Correct!

- $e^{-1/3}$
- $e^{-2/9}$
- $e^{-1/9}$
- $e^{-1/18}$
- $1 - e^{-2/9}$

Question 14

3 / 3 pts

On a particular river, floods occur once every year on average. If the number of floods follows a Poisson distribution, calculate the probability of exactly 3 floods during a particular two-year period.

- 0.003
- 0.015
- 0.061
- Correct! 0.180
- 0.368

Question 15

3 / 3 pts

If $X_1, X_2, \ldots, X_{100}$ are i.i.d. $\text{Nor}(300, 500)$, then what is the distribution of the sample mean $\bar{X}$?

- $\text{Nor}(3, 0.05)$
- $\text{Nor}(3, 5)$
- $\text{Nor}(3, 500)$
- $\text{Nor}(300, 0.05)$
- Correct! $\text{Nor}(300, 5)$

Question 16

3 / 3 pts

Suppose $X_1, \ldots, X_{100}$ are i.i.d. from an $\mathrm{Exp}(1)$ distribution. If we use the Central Limit Theorem approximation, what is $\mathrm{P}\left(\sum_{i=1}^{100} X_i < 97 \right)$?

- 0.242
- Correct! 0.382
- 0.421
- 0.460
- 0.618

Question 17

3 / 3 pts

Suppose you approximating the solution of a simple differential equation involving the function $f(x)$, and you appeal to the relation

$f(x+h) \doteq f(x) + hf'(x)$, where h is some "small" number.

What is this method called?

- Inverse Transform
- LOTUS
- Newton's Method
- Bisection Method
- Euler's Method

Correct!

Question 18

3 / 3 pts

Consider a circle inscribed in a unit square (so that the circle has area $\pi/4$). We toss 1000 darts randomly into the square, and it turns out that 784 of those darts land in the circle. Using the method described in class, estimate π.

Correct!

- (●) 3.136
- ( ) 3.156
- ( ) 3.208
- ( ) 3.422
- ( ) 3.568

Question 19

3 / 3 pts

Suppose we use Monte Carlo integration to approximate $I = \int_2^5 \ell n(2x-4)\,dx$. If $U_1, U_2, \ldots, U_n$ are i.i.d. $\text{Unif}(0,1)$ random numbers, which of the following is a good approximation $\bar{I}_n$ for I?

- $\frac{1}{n}\sum_{i=1}^{n} \ell n(6U_i)$
- Correct! $\frac{3}{n}\sum_{i=1}^{n} \ell n(6U_i)$
- $\frac{1}{n}\sum_{i=1}^{n} \ell n(6U_i - 4)$
- $\frac{3}{n}\sum_{i=1}^{n} \ell n(6U_i - 4)$
- $\frac{6}{n}\sum_{i=1}^{n} \ell n(6U_i - 2)$

Question 20

3 / 3 pts

Consider the following event list for a FIFO single-server queue, where i is the customer's sequence number, A_i is the ith customer's arrival time, T_i is the customer's service start time, and S_i is the customer's service time.

i	A_i	T_i	S_i
1	2	2	6
2	7	8	4
3	10	12	7
4	15	19	3
5	21	22	2

Event list for FIFO

What is the average time in system (service + waiting time) for all 5 customers?

- 1.6
- 2.4
- 3.4
- 4.6
- Correct! 6.0

Question 21

0 / 3 pts

Consider the same FIFO single-server queue event list as in the previous question (table repeated below). What is the maximum number of customers in the system (queue + in-service) at any point in time?

i	A_i	T_i	S_i
1	2	2	6
2	7	8	4
3	10	12	7
4	15	19	3
5	21	22	2

Event list for FIFO

You Answered

- 1

Correct Answer

- 2
- 3
- 4
- 5

Question 22

3 / 3 pts

Consider once again the FIFO single-server queue event list (table below). If the queue had instead been a LIFO queue, then which of the following statements would be TRUE?

i	A_i	T_i	S_i
1	2	2	6
2	7	8	4
3	10	12	7
4	15	19	3
5	21	22	2

Event list for FIFO

- The arrival times $A_1, A_2, \ldots, A_5$ would be different.
- Customer 4 would have been the last to be serviced.
- The average of the service times $S_1, S_2, \ldots, S_5$ would be changed.
- Customer 5 would have been the first to leave the system.
- None of the above.

Correct!

Question 23

0 / 3 pts

TRUE or FALSE? As crazy as it sounds, the $\text{Unif}(0, 1)$ random numbers generated on a computer are actually deterministic!

Correct Answer

- True

You Answered

- False

Question 24

3 / 3 pts

If x and y are two consecutive event times in a discrete-event simulation model, what can happen during the time interval $x < t < y$?

- An arrival can occur.
- A departure can occur.
- A machine breakdown can occur.
- The simulation can end.
- We can insert an event into the Future Events List (FEL).

Correct!

- Nothing can happen.

Question 25

3 / 3 pts

In the course of a simulation study, we should stop to ask, "Does our simulation model correctly mimic the real-world system under study?" What step of the simulation study process is this?

- Problem Formulation
- Data Collection
- Verification
- Validation — Correct!
- Output Analysis

Question 26

0 / 3 pts

TRUE or FALSE? A fixed-increment simulation clock is well-suited for simulations that model continuous-time systems such as the movement of an approaching weather system.

- True — Correct Answer
- False — You Answered

Question 27

0 / 3 pts

Which of the following statements about the future events list (FEL) is TRUE?

- The order of events in the FEL can never change.
- Events can be deleted from the FEL, but not inserted.
- Most of the programming effort when using a commercial simulation package is spent directly managing the FEL.
- Correct Answer — Arena -- and in fact every commercial discrete-event simulation package -- maintains a FEL.
- You Answered — All of the above.

Question 28

3 / 3 pts

Which high-level simulation modeling approach does ARENA employ?

- Event-Scheduling
- Correct! Process-Interaction
- Customer-Process
- Entity-Solving
- Attribute-Recording

Question 29

3 / 3 pts

TRUE or FALSE? In the process-interaction worldview, at any time the system may have many entities interacting with each other as they compete for resources.

- Correct! True
- False

Question 30

3 / 3 pts

TRUE OR FALSE? In ARENA, we can use a SEIZE command to grab one or more resources (servers).

Correct!

- (•) True
- ( ) False

Question 31

0 / 3 pts

Which of the following statements about ARENA is incorrect?

- ( ) The system state is a set of variables containing enough information to describe the system.
- ( ) Entities can be dynamic elements that pass through the system.

You Answered

- (•) You don't have to explicitly handle event scheduling and bookkeeping while using ARENA.

Correct Answer

- ( ) Attributes are global.

Question 32

3 / 3 pts

What ARENA module is used to generate new customers?

- Generate
- Enter
- Create

Correct!

- Start
- Seize

Question 33

3 / 3 pts

What command sequences are possible in an ARENA PROCESS module?

- DELAY
- SEIZE-DELAY
- DELAY-RELEASE
- SEIZE-DELAY-RELEASE
- All of the above

Correct!

Question 34

1 / 1 pts

Who is the best teacher ever?

Correct!

- (•) Dave Goldsman
- ( ) Justin Bieber