EXAM #2

Due Dec 5 at 11:59pm **Points** 101 **Questions** 19
Available Dec 1 at 11:10pm - Dec 5 at 11:59pm **Time Limit** 100 Minutes
Allowed Attempts 2

Instructions

Students should gather all material they may like to consult during the test.

The exam contains 18 questions + and '**honor pledge**', to which students must agree.

The questions are True/False, Multiple Choice, Multiple answers, Fill in the blank(s).

Questions are presented one at a time and are locked after they are answered. Two attempts are allowed for the exam. The final score for the exam is the average of these two attempts.

Attempt History

	Attempt	Time	Score
LATEST	Attempt 2	62 minutes	89 out of 101
	Attempt 1	85 minutes	79 out of 101

Score for this attempt: **89** out of 101
Submitted Dec 4 at 12:05pm
This attempt took 62 minutes.

Question 1 — 1 / 1 pts

I understand that I am allowed to consult any material - notes, videos, online sources.

I understand that I am NOT allowed to discuss the content of this test with anybody - be they fellow students, family, or friends.

I understand failure to abide by this pledge will lead to a zero score for this test and other disciplinary actions.

Please fill in the [Blank] with Yes/yes/YES.

Correct!

yes

orrect Answers

YES

Yes

yes

Question 2

2 / 2 pts

This is a multiple choice question. Select the correct answer.

Modus Ponens is

Correct!

- (•) sound but not complete
- ( ) complete and sound
- ( ) neither sound nor complete

Question 3

2 / 2 pts

Let us assume that we are in a **three-valued logic**. That is, the truth can take three values: **false**, **maybe**, **true** (which can be represented as 0, 0.5, 1 respectively).

The **semantic proofs** of arguments use truth tables.

If an argument has **four propositional letters**, each of which can take **three truth values**, then the truth table will have (*please enter just a*

number, not a formula, or words, etc.):[BLANK]

Correct!

81

orrect Answers

81

Question 4

3 / 3 pts

In this problem, A, B, C denote Boolean random variables, taking the values 0 (for False) and 1(for True).

If

P(A=1 | B=0, C=0) = P(B = 0 |A =1 ,C = 0)

then

P(A=1|C=0) = P(B=0|C=0).

Correct!

- (◉) True
- ( ) False

Question 5

9 / 9 pts

Let A,B and C be random variables, each taking only two values, 1, or 2, and a table whose cells are numbered as shown below

	A=1		**A=2**	
	B=1	B=2	B=1	B=2
C=1	(1)	(2)	(5)	(6)

C=2	(3)	(4)	(7)	(8)

To compute

P(A=1 OR C=2) is equal to (1)+(2)+(3)+(4)+(7)

P(A+B is odd) is equal to (2)+(4)+(5)+(7)

P(A=1 AND B=2) is equal to (2)+(4)

Write your answers without spaces but using parentheses. For example, if one adds cells (1) and (2) the answer should be as (1)+(2). Also, to add say cells (4) and (8), write the answer as (4)+(8) not (8)+(4), that is, write your answers preserving the order of the cell numbers.

Answer 1:

Correct! (1)+(2)+(3)+(4)+(7)+(8)

orrect Answer (1)+(2)+(3)+(4)+(3)+(4)+(7)+(8)-(3)-(4)

orrect Answer (3)+(4)+(1)+(2)+(7)+(8)

orrect Answer (1)+(2)+(3)+(4)+(3)+(4)+(7)+(8)-[(3)+(4)]

Answer 2:

Correct! (2)+(4)+(5)+(7)

Answer 3:

Correct! (2)+(4)

Question 6

2 / 2 pts

If P(A | B, C) = P(A), **then** P(B|C) = P(B).

True

Correct!

False

Question 7

6 / 6 pts

In this problem we consider a test, T, for a disease, D. Let t denote that T is positive, and ~t that T is negative. Let d denote that D is present, and ~d that D is not present.

We are given the following:

P(t | d) = 0.8, P(~t| ~d) = 0.8, P(d) = 0.01

Then P(d|t) = (0.8)(0.01) / {0.8)(0.01) +[Blank]}.

Provide your answer either as an expression of the type (....)(....) where each parentheses contains an expression, or as (..)(..), where each parentheses contains a single numeric value, or as a single decimal value rounded to one decimal digit, that is, of the type X.X .

Correct!

0.2

orrect Answers

0.2

(1-0.8)(1-0.01)

(0.2)(1.0)

0.198

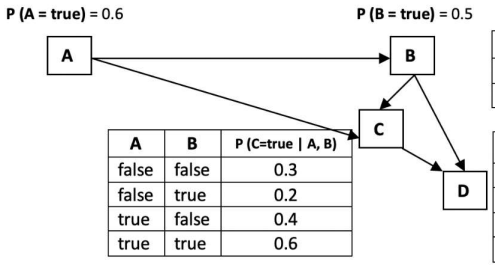
(0.2)(0.99)

(0.2)(1)

Question 8

0 / 10 pts

This question refers to the Bayesian network shown below.



A	P (B=true | A)
false	0.2
true	0.6

A	B	P (C=true | A, B)
false	false	0.3
false	true	0.2
true	false	0.4
true	true	0.6

B	C	P (D = false | B, C)
false	false	0.4
false	true	0.2
true	false	0.9
true	true	0.1

Using the Global Semantics of a Bayesian Network, **P(A=true, B=false, C=false, D=true)** is evaluated to be equal to

- None of the other answers provided
- 0.64
- 0.144
- 0.218 (You Answered)
- 0.108

orrect Answer

Question 9

3 / 3 pts

This is a fill in the blank question. Students see the question followed by a small textbox in which to enter their answer. Let X and Y be two random variables.

Let X, Y, and Z be random variables, each taking on the values, 0, or 1, and a table whose cells are numbered as shown below. Cells convey the respective probabilities. For example, cell (1) stands for P(X=1, Y=1, Z=1).

	X=1		X=0	
	Y = 1	Y = 0	Y = 1	Y=0

Z=1	(1)	(2)	(5)	(6)
Z=0	(3)	(4)	(7)	(8)

Adding the cells (5)-(8) computes the probability P([Blank]).

Write your answer as a mathematical formula <variable>=<value>, with no spaces. For example, if you were to write that variable X had to be 1, the correct answer would be X=1 (with no spaces).

Correct!

X=0

orrect Answers

X=0

Question 10

2 / 2 pts

This is a fill in the blank question. Students see the question followed by a small textbox in which to enter their answer. Let X and Y be two random variables.

Then P(X|Y,X)=[Blank]

Please enter a numerical value in the closed interval [0, 1].

Correct!

1

orrect Answers

1

Question 11

6 / 6 pts

This is a multiple answers question. Choose all the correct answers.

Let X and Y be random variables, taking values x, and y respectively. Assume that

P(x)=P(X=x) = 0.7.

A rational agent can hold one or more of the following beliefs (choose all the correct answers).

Correct!

- [x] It is possible that P(x OR y)=0.8 for some y.
- [ ] It is possible that P(x AND y)=0.75 for some y.
- [ ] For any y, P(x OR y)=0.5

Correct!

- [x] It is possible that P(x OR y)=0.75 for some y.

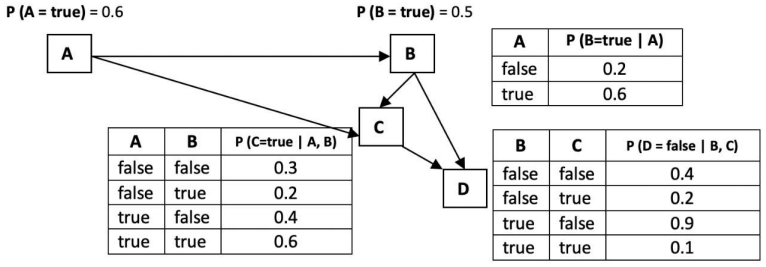
Correct!

- [x] It is possible that P(x AND y) = 0.5 for some y.

Question 12

10 / 10 pts

This question refers to the following Bayesian Network



A	P (B=true | A)
false	0.2
true	0.6

A	B	P (C=true | A, B)
false	false	0.3
false	true	0.2
true	false	0.4
true	true	0.6

B	C	P (D = false | B, C)
false	false	0.4
false	true	0.2
true	false	0.9
true	true	0.1

Then the expression (1-0.9)(1-0.2)(0.2)(0.5)+(1-0.4)(1-0.3)(1-0.2)(0.5) corresponds to the value of

Correct!

- (•) P(A = false, C = False, D = true)
- ( ) P(A = false | C = False, D = true)

Question 13

3 / 3 pts

An inference procedure is said to be ***complete*** and ***sound*** if

- some of its conclusions are logically entailed from its premises
- it proves all the logical entailments from premises
- None of the other three answers

Correct!

- (selected) it proves only and all conclusions which are logically entailed by its premises

Question 14

3 / 3 pts

This is a fill in the Blank question. Students will see the question followed by a small text box to type their answer.

Resolution is sound and complete when the knowledge base is expressed as [Blank] clause logic.

Correct!

horn

orrect Answers

Horn

Question 15

10 / 10 pts

In the following, the variables x, and y stand for positive integers, that is, $x \geq 0, y \geq 0$.

Is $\forall x, \exists y$, such that $x \geq y$ true? Fill in YES **with YES or NO**

Is $\exists y, \forall x, x \geq y$ true? Fill in YES **with YES or NO**

Does $\forall x, \exists y\ x \geq y$ imply $\exists y, \forall x\ x \geq y$? Fill in NO **with YES or NO**

Does $\exists y, \forall x\ x \geq y$ imply $\forall x, \exists y\ x \geq y$? Fill in YES **with YES or NO**

Answer 1:

Correct! YES

Answer 2:

Correct! YES

Answer 3:

Correct! NO

Answer 4:

Correct! YES

Question 16

3 / 3 pts

This is a fill in the Blank question. Students will see an empty textbook to type their answer.

In the following, x and y are variables, A and B are constants.

Fill in the correct substitution such that each of **a(A, x)** and **a(y, B)** will be the same expression (this process is called Unification).

SUBST{x/ B **, y/** A **}**

Answer 1:

Correct! B

Answer 2:

Correct! A

Question 17

0 / 2 pts

This is a multiple choice question.

Let X, Y, Z be arbitrary random variables.

If **P(X | Y, Z) = P(X)**, then **P(Y, Z | X)** is equal to

- None of the other answers
- P(X)P(Z)
- 0
- orrect Answer 1
- ou Answered P(X,Z)=P(X)P(Z)

Question 18

20 / 20 pts

Let A, B, C, D be Boolean variables with values as shown in the Table below:

A	B	C	D
1	0	0	1
0	0	1	0
1	1	1	1
1	1	0	0
0	1	0	1
1	0	1	0

Assume that we want to build a Bayesian Network as follows:

A is the root; B and C are its children; Both B and C are D's parents.

Assume that P(A=1)=0.5

Using the table, above fill in the values for the following:

CPT Table for B: P(B=1|A=1)= 0.5 ; P(B=1|A=0)=

0.5

CPT Table for C: P(C=1|A=1) = 0.5 ; P(C=1|A=0)=

0.5

CPT Table for D:

P(D=1|B=1, C=1) = 1 ; P(D=1|B=1, C=0)=

0.5

P(D=1|B=0, C=1) = 0 ; P(D=1|B=0, C=0)=

1

Compute

P(B=1, C=1|A=1) = 0.25 ;

P(B=1, C=0|A=1)= 0.25

P(B=0, C=1|A=1)= 0.25

P(B=0, C=0|A=1)= 0.25

Based on all the computations above, would say that B and C are conditionally independent given A? yes Write YES/Yes/yes or NO/No/no.

Answer 1:

Correct!

0.5

Answer 2:

Correct!

0.5

Answer 3:

Correct!

0.5

Answer 4:

Correct!

0.5

Answer 5:

Correct!

1

Answer 6:

Correct!

0.5

Answer 7:

Correct!

0

Answer 8:

Correct! 1

Answer 9:

Correct! 0.25

orrect Answer .25

Answer 10:

Correct! 0.25

orrect Answer .25

Answer 11:

Correct! 0.25

orrect Answer .25

Answer 12:

Correct! 0.25

orrect Answer .25

Answer 13:

Correct! YES

orrect Answer Yes

orrect Answer yes

Question 19

4 / 4 pts

This question concerns the relation between the concepts of independence and conditional independence.

1) If X and Y are independent, then they are conditionally independent

False . Fill this answer with True or False.

2) If X and Y are conditionally independent, then they are independent

False . Fill this answer with True or False.

Answer 1:

Correct! False

Answer 2:

Correct! False

Quiz Score: **89** out of 101