

CSPB 2824 - Stade - Discrete Structures

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**Started on** Thursday, 31 August 2023, 4:05 PM

**State** Finished

**Completed on** Thursday, 31 August 2023, 4:20 PM

**Time taken** 15 mins 14 secs

**Marks** 9.00/9.00

**Grade** 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out of 1.00

Consider the sentence: *Follow the yellow-brick road.*

This sentence is  ✓ .

The truth value of this sentence is  ✓ .

Your answer is correct.

This sentence is **not a proposition**, because it's a command, which doesn't have a truth-value.

The truth value of this sentence is **undefined**, because the sentence is not a proposition.

Marks for this submission: 1.00/1.00.

## Question 2

Correct

Mark 1.00 out of 1.00

Consider the sentence: *The moon is made of green cheese.*

This sentence is  ✓ .

The truth value of this sentence is  ✓ .

Your answer is correct.

**Solution:**

The sentence is **a proposition**, because it has a truth value.

The truth value of this sentence is **false**.

Correct

Marks for this submission: 1.00/1.00.

## Question 3

Correct

Mark 1.00 out of 1.00

Consider the sentence *Amherst is the capital of Massachusetts.*

This sentence is  ✓ .

The truth value of this sentence is  ✓ .

Your answer is correct.

**Solution:**

The sentence is **a proposition**, because it has a truth value.

The truth value of this sentence is **false**.

Correct

Marks for this submission: 1.00/1.00.

Question **4**

Correct

Mark 1.00 out of 1.00

Consider the sentence: *Answer this question!*

This sentence is  ✓ .

The truth value of this sentence is  ✓ .

Your answer is correct.

This sentence is **not a proposition**, because it's a command, which doesn't have a truth-value.

The truth value of this sentence is **undefined**, because the sentence is not a proposition.

Correct

Marks for this submission: 1.00/1.00.

Question 5

Correct

Mark 1.00 out of 1.00

Complete the last column of the truth table.

**NOTE:** Do this on paper first and check your work. Don't try to do it in your head!

$p$	$q$	$\neg(p \wedge q)$
T	T	<input type="text" value="F"/> ✓
T	F	<input type="text" value="T"/> ✓
F	T	<input type="text" value="T"/> ✓
F	F	<input type="text" value="T"/> ✓

Your answer is correct.

We have

$p$	$q$	$p \wedge q$	$\neg(p \wedge q)$
$T$	$T$	$T$	$F$
$T$	$F$	$F$	$T$
$F$	$T$	$F$	$T$
$F$	$F$	$F$	$T$

Correct

Marks for this submission: 1.00/1.00.

Question 6

Correct

Mark 1.00 out of 1.00

Complete the last column of the truth table.

**NOTE:** Do this on paper first and check your work. Don't try to do it in your head!

$p$	$q$	$(p \rightarrow q) \leftrightarrow (\neg p \vee q)$
T	T	<div>T ✓</div>
T	F	<div>T ✓</div>
F	T	<div>T ✓</div>
F	F	<div>T ✓</div>

Your answer is correct.

We have

$p$	$q$	$p \rightarrow q$	$\neg p \vee q$	$(p \rightarrow q) \leftrightarrow (\neg p \vee q)$
$T$	$T$	$T$	$T$	$T$
$T$	$F$	$F$	$F$	$T$
$F$	$T$	$T$	$T$	$T$
$F$	$F$	$T$	$T$	$T$

Correct

Marks for this submission: 1.00/1.00.

Question 7

Correct

Mark 1.00 out of 1.00

Let  $p$ ,  $q$ ,  $r$ , and  $s$  be the following propositions:

- $p$ : Colonel Mustard was murdered
- $q$ : The butler did it
- $r$ : Miss Scarlet is lying
- $s$ : The murder weapon was the candlestick

Which of the following corresponds to the proposition: *Either Miss Scarlet is lying or the butler didn't do it, but not both*

Select one:

☐  $q \oplus r$ ☒  $r \oplus \neg q$ ☐  $s \leftrightarrow \neg r$ ☐  $r \vee \neg q$ 

Your answer is correct.

**Solution:**

$r$  = Miss Scarlet is lying

$\neg q$  = The butler didn't it

$\oplus$  = Either, but not both

So we have  $r \oplus \neg q$

Correct

Marks for this submission: 1.00/1.00.

Question 8

Correct

Mark 1.00 out of 1.00

Let  $p$ ,  $q$ ,  $r$ , and  $s$  be the following propositions:

- $p$ : Chris is a teacher
- $q$ : Jessica is a lawyer
- $r$ : Chris is satisfied with his career
- $s$ : Jessica is satisfied with her career

Which of the following English sentences corresponds to the proposition:  $q \wedge \neg s$

Select one:

- ☐ Chris is a teacher and he is satisfied with his career.
- ☐ If Jessica is a lawyer then she is not satisfied with her career.
- ☐ Either Jessica is a lawyer, or she is not satisfied with her career.
- ☒ Jessica is a lawyer and she is not satisfied with her career. ✓

Your answer is correct.

**Solution:**

$q$ : Jessica is a lawyer

$\neg s$ : Jessica is not satisfied with her career

$\wedge$ : the conjunction *and*

So we have, Jessica is a lawyer and she is not satisfied with her career.

Correct

Marks for this submission: 1.00/1.00.

Question 9

Correct

Mark 1.00 out of 1.00

Suppose that Smartphone A has 256 MB RAM and 32 GB ROM, and the resolution of its camera is 8 MP; Smartphone B has 288 MB RAM and 64 GB ROM, and the resolution of its camera is 4 MP; and Smartphone C has 128 MB RAM and 32 GB ROM, and the resolution of its camera is 5 MP. Determine the truth value of each of these propositions.

- Smartphone B has the most RAM of these three smartphones.  ✓
- Smartphone C has more ROM or a higher resolution camera than Smartphone B.  ✓
- Smartphone B has more RAM, more ROM, and a higher resolution camera than Smartphone A.  ✓
- If Smartphone B has more RAM and more ROM than Smartphone C, then it also has a higher resolution camera.  ✓
- Smartphone A has more RAM than Smartphone B if and only if Smartphone B has more RAM than Smartphone A.  ✓

Your answer is correct.

**Solution:**

- Smartphone B has the most RAM of these three smartphones.  $[[1]]$

This is **true**, b/c  $288 \text{ MB} > 256 \text{ MB}$  and  $288 \text{ MB} > 128$

- Smartphone C has more ROM or a higher resolution camera than Smartphone B.

This is **true**, b/c although C has less ROM than B, it does have a higher resolution camera.

- Smartphone B has more RAM, more ROM, and a higher resolution camera than Smartphone A.

This is **false**, b/c although B does have more RAM and ROM than A, it does not have a higher resolution camera.

- If Smartphone B has more RAM and more ROM than Smartphone C, then it also has a higher resolution camera.

This is **false**, b/c B does have more RAM and ROM than C, but it does not have a higher resolution camera. Thus the conditional has the form  $T \rightarrow F$  which is a false conditional.

- Smartphone A has more RAM than Smartphone B if and only if Smartphone B has more RAM than Smartphone A.

This is **false**, b/c B does have more RAM than A, giving the biconditional the form  $F \leftrightarrow T$  which is **false**.

Correct

Marks for this submission: 1.00/1.00.