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| Started on   | Monday, 25 September 2023, 7:56 AM |
| State        | Finished                           |
| Completed on | Monday, 25 September 2023, 8:24 AM |
| Time taken   | 28 mins 38 secs                    |
| Marks        | 12.00/15.00                        |
| Grade        | 8.00 out of 10.00 (80%)            |
| Feedback     | Great work!                        |

Question **1**

Complete

Mark 1.00 out of 1.00

Find

$$(101001 \wedge 110011) \oplus 011011$$

Answer:

111010

Question **2**

Complete

Mark 0.00 out of 1.00

Find truth values of  $p$ ,  $q$  so that the following proposition is True?

$$(p \vee q) \wedge (p \vee \neg q) \wedge (\neg p \vee q) \wedge (\neg p \vee \neg q)$$

Select one:

- ☐ a.  $p = \text{True}, q = \text{False}$
- ☐ b.  $p = \text{False}, q = \text{True}$
- ☐ c. None of the other choices is correct
- ☒ d.  $p = \text{False}, q = \text{False}$
- ☐ e.  $p = \text{True}, q = \text{True}$

Question **3**

Complete

Mark 1.00 out of 1.00

Find the negation of

$\exists x \forall y (\exists z T(x, y, z) \wedge \neg Q(x, y)).$

Select one:

- ☐ a.  $\forall x \exists y (\forall z \neg T(x, y, z) \wedge \neg Q(x, y))$
- ☒ b.  $\forall x \exists y (\forall z \neg T(x, y, z) \vee Q(x, y))$
- ☐ c.  $\forall x \forall y (\forall z \neg T(x, y, z) \wedge Q(x, y))$
- ☐ d.  $\forall x \exists y (\forall z T(x, y, z) \vee Q(x, y))$

Question **4**

Complete

Mark 1.00 out of 1.00

Compute  $\sum_{i=0}^5 (2 \cdot 3^i + 3 \cdot 2^i).$

Answer:

Question **5**

Complete

Mark 0.00 out of 1.00

Given the argument:

**"If Jack is a soccer player then Jack is rich. Jack only plays pingpong. Therefore, Jack is not rich."**

Choose correct statement:

Select one:

- ☐ a. This argument is a fallacy
- ☐ b. This valid argument is based on disjunctive syllogism
- ☐ c. This valid argument is based on modus ponens
- ☐ d. This valid argument is based on hypothetical syllogism
- ☒ e. This valid argument is based on modus tollens

Question **6**

Complete

Mark 1.00 out of 1.00

Which of the following statements is true?

Select one:

- ☐ a.  $\emptyset \in \{x\}$
- ☒ b.  $\{x\} \subseteq \{x\}$
- ☐ c.  $\{x\} \subset \{x\}$
- ☐ d.  $\{x\} \in \{x\}$

Question **7**

Complete

Mark 1.00 out of 1.00

Let  $f : \mathbb{Z} \rightarrow \mathbb{N}$  be the function defined as follows

$$f(n) = \begin{cases} -2n, & n \leq 0 \\ 2n - 1, & n > 0 \end{cases}$$

Choose the correct answer.

Select one:

- ☐ a.  $f$  is neither one-to-one nor onto.
- ☐ b.  $f$  is one-to-one but not onto.
- ☐ c.  $f$  is onto but not one-to-one.
- ☒ d.  $f$  is a bijection.

Question **8**

Complete

Mark 1.00 out of 1.00

Find the cardinality of the set  $\{a, \{a\}, \{a, \{a\}\}\}$ .

Answer:

3

Question **9**

Complete

Mark 0.00 out of 1.00

Compute  $\left\lfloor \frac{3}{2} - \left\lceil 3 + \frac{5}{4} \right\rceil \right\rfloor$ .

Answer:

-3

Question **10**

Complete

Mark 1.00 out of 1.00

Let

$P(x)$  = " $x$  goes to class regularly"

$Q(x)$  = " $x$  reads books"

$R(x)$  = " $x$  passed the exam"

Translate the sentence into logical expression, domain is the set of all students in class.

"Any student who goes to class regularly or reads books passed the exam".

Select one:

- ☐ a.  $\forall x((P(x) \vee Q(x)) \wedge R(x))$
- ☐ b. None of the other choices is correct
- ☒ c.  $\forall x((P(x) \vee Q(x)) \rightarrow R(x))$
- ☐ d.  $\forall x((P(x) \wedge Q(x)) \vee R(x))$
- ☐ e.  $\forall x((P(x) \wedge Q(x)) \rightarrow R(x))$

Question **11**

Complete

Mark 1.00 out of 1.00

Given the sequence 1, 3, 3, 3, 5, 5, 5, 5, 5,...  
constructed by including the integer  $2k + 1$  exactly  $2k + 1$  times.  
Find the  $200^{th}$  term.

Select one:

- ☐ a. None of the other choices is correct
- ☐ b. 27
- ☐ c. 30
- ☐ d. 29
- ☒ e. 28

Question **12**

Complete

Mark 1.00 out of 1.00

Let  $A$  and  $B$  be sets such that  $|B| = |A| - 2$ . Assume that the set  $A \times B$  has 360 elements. Find  $|B|$ .

Select one:

- ☐ a. None of the other choices is correct.
- ☐ b. 22
- ☒ c. 18
- ☐ d. 25
- ☐ e. 20

Question **13**

Complete

Mark 1.00 out of 1.00

Let  $p, q$  be the propositions

$p =$  "*She is out of work.*"

$q =$  "*She spends less on clothes.*"

Translate the sentence into a logic expression

*"Although she is out of work, she doesn't spend less on clothes."*

Select one:

- ☐ a.  $p \rightarrow \neg q$
- ☒ b.  $p \wedge \neg q$
- ☐ c.  $p \vee \neg q$
- ☐ d.  $p \leftrightarrow \neg q$
- ☐ e.  $\neg q \rightarrow p$

Question **14**

Complete

Mark 1.00 out of 1.00

**TRUE or FALSE?**

For all integer  $n$ ,

$$\lfloor n/2 \rfloor \lceil n/2 \rceil = \lceil n^2/4 \rceil.$$

Select one:

- ☐ True
- ☒ False

Question **15**

Complete

Mark 1.00 out of 1.00

**The premises:**

"I am able to speak English or German",

"If I can speak German, I will study for a master's degree in Germany",

"I do not study a master's degree in German".

**Which conclusion can be drawn?**

Select one:

- ☒ a. I can speak English but cannot speak German
- ☐ b. No conclusion can be drawn
- ☐ c. I can speak German but cannot speak English
- ☐ d. I can speak both English and German