

BMCC MAT100.722 Exam 1

October 7, 2009

Abstract

You will be given all class to complete this test. You are allowed to have one sheet of notes. Each problem is worth 10 points. Good luck!

1 Vocabulary

Match the concept in the first column with an example from the second.

- | | |
|-----------------------------------|---------------------------------|
| (a) A is a proper subset of B | (1) $\sim q \Rightarrow \sim p$ |
| (b) Contrapositive | (2) For all, none, for each |
| (c) Universal Quantifier | (3) $A = B$ |
| (d) Contradiction | (4) $A = \{\}$ |
| (e) A is a subset of B | (5) $p \Leftrightarrow \sim p$ |

2 Sets

Replacing ??? with what symbol will make the following statement true?

$$\emptyset \quad ??? \quad A$$

(A) $=$

(B) $\equiv$

(C) $\subset$

(D) $\in$

3 Sets

Let the set of multiples of 4 be named F . Similarly let the set of multiples of 6 be named S . That is,

$$F = \{4, 8, 12, 16, \dots\} \quad (1)$$

$$S = \{6, 12, 18, 24, \dots\} \quad (2)$$

(A) **Are F and S equal, equivalent, both or neither?**

- (a) $F = S$.
- (b) $F \equiv S$.
- (c) $F \equiv S$ and $F = S$.
- (d) $F \neq S$ and $F \not\equiv S$.

(B) **What is the set $F \cap S$?**

- (a) $\{12, 24, \dots\}$ (The set of the multiples of 12)
- (b) $\{12\}$.
- (c) $\{2, 4, 6, 8, \dots\}$ (The set of even numbers).
- (d) $\{1, 3, 5, 7, \dots\}$ (The set of odd numbers).

4 Sets

Explain why “the set of sets” is not a well-defined set.

5 Logic

(A) **If $\sim(p \wedge q)$ is false, what must be the truth values of the component statements?**

- (a) T
- (b) F
- (c) $\sim p \vee \sim q$
- (d) $\sim p \wedge \sim q$

(B) Identify a suitable converse of the statement “No teachable kitten has green eyes.”

- (a) All green-eyed kittens are teachable.
- (b) If it is a teachable kitten, it has green eyes.
- (c) If it is a kitten with green eyes, it is teachable
- (d) If it is a kitten with green eyes, it is not teachable

6 Logic

- (A) For how many cases, i.e. rows in the truth table, is the following statement F?

$$(p \Rightarrow q) \wedge (\sim q) \wedge p$$

- (a) 1
- (b) 2
- (c) 3
- (d) 4

- (B) For how many cases is the following statement T?

$$\sim(\sim p \wedge \sim q) \wedge \sim(p \wedge q)$$

- (a) 0
- (b) 1
- (c) 2
- (d) 3

7 Logic

Explain why the statement “A week has eight days if and only if October has forty days” is true.

8 Number Systems

List and explain some advantages of place value.

9 Number Systems

Identify the correct Egyptian multiplication work for the problem $33 \cdot 81$.

(A) 2673

(B) 1089

(C)

$$\rightarrow 1 \leftrightarrow 81$$

$$2 \leftrightarrow 162$$

$$4 \leftrightarrow 324$$

$$8 \leftrightarrow 648$$

$$16 \leftrightarrow 1296$$

$$\rightarrow 32 \leftrightarrow 2592$$

$$33 = 32 + 1 \leftrightarrow 33 * 81 = 81 + 2592 = 2673.$$

(D)

$$\rightarrow 1 \leftrightarrow 33$$

$$2 \leftrightarrow 66$$

$$4 \leftrightarrow 132$$

$$8 \leftrightarrow 264$$

$$16 \leftrightarrow 528$$

$$\rightarrow 32 \leftrightarrow 1056$$

$$33 = 32 + 1 \leftrightarrow 33 * 81 = 33 + 1056 = 1089.$$

10 History

Describe something you have learned about Évariste Galois and his contributions to mathematics.