MATH 170 EXAM 01

BLAKE FARMAN UNIVERSITY OF SOUTH CAROLINA

Answer the questions in the spaces provided on the question sheets and turn them in at the end of the class period. If you require extra space, use the back of the page and indicate that you have done so.

Unless otherwise stated, all supporting work is required. Unsupported or otherwise mysterious answers will **not receive credit**.

Name: Volutions - Vension?

Problem	Points Earned	Points Possible
1		10
2		20
3		12
4	15	18
5		20
6		20
Bonus		10
Total		100

Date: February 26, 2016.

1 (10 Points). Let S be the set of all students at the University of South Carolina. Le	t A be
the subset of all students taking Math 170 this semester. Let B be the subset of all st	udents
not majoring in business.	

(a) In words, what does the set $A \cup B$ represent?

The set of students taking 170 or not majoring in Guriness.

(b) In words, what does the set $A \cap B$ represent?

The set of students taking 170 and not majoring in business.

(c) In words, what do the sets $S \setminus A$ and $S \setminus B$ represent? $S \mid A$ is the set of students not toking 170 $S \mid B$ is the set of students mijoring in business.

(d) In words, what does the set $(S \setminus A) \cap (S \setminus B)$ represent? The set of students not taking 170 and majoring in business.

(e) In words, what does the set $(S \setminus A) \cup (S \setminus B)$ represent? The set of stuckers not toking ITO or are majoring in business. 2 (20 Points). A bag contains three red marbles, two green marbles, one lavender marbles, one yellow marble, and one orange marble. The marbles are all distinguishable.

(a) How many sets of four marbles include none of the red ones?

total marbles. There are 5 marbles once the reals have been removed so there are

(b) How many sets of four marbles include exactly one red marble?

$$\binom{3}{1} = \frac{3!}{(3-1)! \cdot 1!} = \frac{3!}{2! \cdot 1!} = \frac{3 \cdot 2 \cdot 1}{2! \cdot 1!} = 3$$

ways to choose one red marble and

$$\binom{5}{3} = \frac{5!}{(55)!3!} = \frac{6!}{2'3!} = \frac{5 \cdot 4 \cdot 3!}{2!3!} = \frac{20}{2} = 10$$

ways to choose the other three. Therefore There are

ways to choose such a set

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3 (12 Points). How many two letter sequences can be made using the six letters q, u, a, k, e?

$$P(5,2) = \frac{5!}{(5\cdot 2)!} = \frac{5!}{3!} = \frac{5\cdot 4\cdot 3!}{3!} = 5\cdot 4 = 20.$$

Let $U = \{A, B, C, D, E, F, G\}$. Let $X = \{B, D, F\}$, $Y = \{A, F, G\}$, and $Z = \{A, B, E, G\}$. Use these sets to answer problems 4 and 5.

4 (18 Points). Compute

(a) $X \cap Y$,

EF3

(b) $X \cup Z$,

{A,B,D,E,E,G}

(c) The complement of Z in U, $U \setminus Z$.

{ C, D, F}

5 (20 Points). (a) What is the cardinality of $X \times Z$?

$$|X \times Z| = |X||Z| = 3.4 = 12$$

(b) What is the cardinality of $Y \cup Z$?

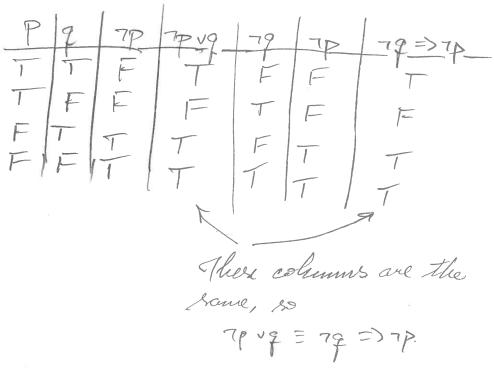
$$|\underline{y}_{0}z| = |\underline{y}_{1} + |\underline{z}_{1} - |\underline{y}_{n}z_{1}|$$

= 3+4-2
= 5.

6 (20 Points). Use a truth table to prove the following logical equivalences.

(a)

$$\neg p \lor q \equiv \neg q \implies \neg p$$



(b)

$$p \wedge (p \vee q) \equiv p.$$