MATH 201 **HW 9 - section D, 1pm**

due **Mar 25** before class.

Staple all your papers. Write carefully, unreadable answers will not receive any credit. Write your opinion about every question - good - bad - ugly - (or some other) and difficulty.

Please write your section or time of your class on you HW.

1: Let X and Y be subsets on integers. For the following sentence, write it in symbolic logic, then negate it and write it as an English sentence.

For ever positive number from the set Y holds that if it is even, then its square is also even and its square belongs to the set X.
(This question is: good - bad - ugly? Difficulty: 0-9:)

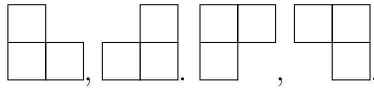
2: Prove by contradiction: If a and b are positive real numbers, then $a + b \geq 2\sqrt{ab}$.
(This question is: good - bad - ugly? Difficulty: 0-9:)

3: Given an integer a, then $a^3 + a^2 + a$ is even if and only if a is even.
(This question is: good - bad - ugly? Difficulty: 0-9:)

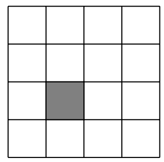
4: Prove without using Venn diagrams that if A, B and C are sets, then $A \times (B \cup C) = (A \times B) \cup (A \times C)$.
(This question is: good - bad - ugly? Difficulty: 0-9:)

5: Prove or disprove it: There exist **unique** prime numbers p and q for which $p - q = 17$.
(This question is: good - bad - ugly? Difficulty: 0-9:)

6: Use induction to show that for every natural number $n \geq 1$, it is possible to tile the grid $(1, \ldots, 2^n) \times (1, \ldots, 2^n)$, that is missing arbitrary one piece 1×1 by pieces of L shape, that is



Examples of the grid to tile for $n = 2$, the dark piece is missing. Notice that there are several different cases for every n.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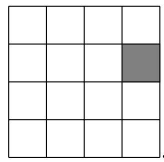

(This question is: good - bad - ugly? Difficulty: 0-9:   *)*