

ASSIGNMENT 1

MATH 303, FALL 2011

Instructions: *Do at least 3 points from each section and at least 10 points total. Up to 12 points will be graded, but your maximum score is 10. If you hand in more than 12 points please indicate which ones you want graded, otherwise the first 12 will be graded.*

MANIPULATION

(M1) (1 point) Simplify the following set

$$\{\{\{\emptyset\}, \{\emptyset\}\}, \{\emptyset, \{\emptyset\}\}, \{\{\emptyset\}\}$$

(M2) (1 point) Let A and B be sets. Show that $A \subseteq B$ implies $A \cup B = B$.

(M3) (1 point) Let A and B be sets. Show that $A \cup B = B$ implies $A \subseteq B$.

(M4) (1 point) Let $\mathcal{C} = \{\{\emptyset\}, \{\emptyset, \{\emptyset\}\}, \emptyset\}$. What is $\bigcup \mathcal{C}$?

(M5) (1 point) Build $\{\{\emptyset\}, \{\{\emptyset\}\}, \{\emptyset, \{\emptyset\}\}$ out of \emptyset , pairs, and unions.

PURE MATH

(P1) (4 points) The exercise from Halmos page 10.

(P2) (3 points) Using only the empty set, pairs, and unions can you form sets with infinitely many elements?

IDEAS

(I1) (3 points) Find an example of Russell's paradox in the world (eg. in a puzzle book, in literature, in a comic, ...) and explain how it is an example (what plays the role of sets, what is \in ?)

(I2) (5 points) The barber paradox and other interpretations of Russell's paradox are somewhat contrived. Give your own version of the paradox and try to make it as compelling as possible. (If you are inspired by someone or something please be sure to give appropriate credit). Briefly describe (maximum 2 paragraphs) what makes such an interpretation more compelling or less compelling.