

## ASSIGNMENT 4

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) **(2 points)** Is the set of integers with the usual  $\leq$  well ordered? Explain.
- (M2) **(1 point)** Let  $A = \{1, 2, 3\}$  and let  $B = \{4, 5\}$ . What is the size of  $A \times B$ ?
- (M3) **(1 point)** Let  $A = \{8, 96\}$  and let  $B = \{6, 7, 8\}$ . What is the size of  $B^A$ ?
- (M4) **(1 point)** Let  $A = \{5, 7, 83, 251\}$  what is the size of  $\mathcal{P}(A)$ ?

### PURE MATH

- (P1) **(3 points)** Let  $X, Y$ , and  $Z$  be sets. Give a one-to-one and onto map between  $(Z^Y)^X$  and  $Z^{X \times Y}$ .
- (P2) **(3 points)** Let  $E$  be any set. Check that the subset relation on  $\mathcal{P}(E)$  gives a partial order. Give an example to show that this is not always a total order.
- (P3) **(3 points)** Consider a sequence

$$a_0, a_1, a_2, \dots$$

with the  $a_i \in \{0, 1\}$ .

- (a) Write the sequence as a family. Be sure to specify
  - (i) the index set,
  - (ii) the codomain,
  - (iii) the function itself.
- (b) What part of your answer would change if  $a_i \in A$  for some set  $A \neq \{0, 1\}$ .

### IDEAS

- (I1) **(3 points)** In view of the other questions on this homework, why do you think we use the notation  $Y^X$  and  $X \times Y$  for the set of functions and the cartesian product respectively. Discuss.
- (I2) **(2-5 points)** What do you think of the axiom of choice? Is it a good axiom? Is it a useful axiom?