MATH 347 HW 4

due October 16, at the beginning of class

Homework Guildlines

Obviously, your solutions need to be complete and correct, but to receive full credit your write-up should also satisfy the following:

- All the important logical steps in the proof should be present and fully explained.
- All assumptions should be clearly identified.
- Your solutions should be clear and concise. If a sentence does not further the reader's understanding of the solution then it has no place in your write up.
- Use full and grammatically correct English sentences. Mathematical symbols should be used only to render complex mathematical relationships into a readable form.

Moreover, in order to obtain full credit for the homework, you must write down, in the very least, an attempt at a solution for each problem.

Problems

Do the following problems from your book: 4.5, 4.8, 4.9, 4.12. Also answer the following:

(1) (a) Let $\mathbb{2}$ denote the set $\{0,1\}$ and let Y^X denote the set of functions from X to Y. Show there is a bijection between the set $\mathscr{P}(X)$ and the set $\mathbb{2}^X$. Determine the function and its inverse. (Hint: Consider (or look up) characteristic functions.)

(b) Given sets X, Y, Z, exhibit a bijection between the sets $X^{Y\times Z}$ and $(X^Z)^Y$. Determine the function and its inverse. Note that the set $(X^Z)^Y$ is the set of functions $Y \to X^Z$, i.e. function which assign to each $y \in Y$ a function $Z \to X$. (Hint: Given a function in two variables, how can we think of it as a function in one variable (with possibly changing the codomain)?)