# MATH 347 HW 2

due September 25, 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: 2.40a, 2.48, 2.53, 3.10, 3.11. Also answer the following:

(1) A very special island is inhabited only by knights and knaves. Knights always tell the truth, and knaves always lie.

You meet four inhabitants: Dave, Rex, Bart and Zoey. Dave tells you that Bart could say that Rex is a knave. Rex claims, I would tell you that Bart is a knave. Bart claims, Only a knave would say that Zoey is a knave. Zoey claims, I and Dave are different.

Can you determine who is a knight and who is a knave?

(2) Suppose that $A \subseteq \mathbb{R}$ is closed under multiplication (that is, if $x, y \in A$ then $xy \in A$) and that it is the disjoint union of two subsets $B$ and $C$. Suppose also that the product of any three (not necessarily distinct) elements in $B$ is in $B$ and that the product of any three (not necessarily distinct) elements of $C$

is in $C$. Show that at least one of $B, C$ is also a multiplicative set.