CSC/MAT-220: Homework 2

Due: 9/14/2018

Book Problems

Please do each of the following problems from the class book [2]:
8.12, 9.7, 9.15, 10.2, 10.3, 10.13, 12.21, 13.5, and 13.6

Other Problems

I. The following problem is taken from [1]: Write the following definitions and their negation using quantifiers and logical symbolism.

   (a) A function $f\colon D \to \mathbb{R}$ is *continuous* at $c \in D$ if and only if for every $\epsilon > 0$ there exists a $\delta > 0$ such that $|f(x) - f(c)| < \epsilon$ whenever $|x - c| < \delta$ and $x \in D$.

   (b) A function f is *uniformly continuous* on a set S if and only if for every $\epsilon > 0$ there is a $\delta > 0$ such that $|f(x) - f(y)| < \epsilon$ whenever x and y are in S and $|x - y| < \delta$.

II. Recall the island of knights and knaves from Homework 1. This problem is taken from [3]: I once visited an island of knights and knaves in which certain knights have been proven to be knights (certified knights) and certain knaves have been proven to be knaves (certified knaves). Those who are not certified are called uncertified. Answer each of the following questions.

   (a) I came across a native of the island who said, "I am not a certified knight." Was he a knight or a knave? Was he certified?

   (b) I came across a native who made a statement from which I could deduce that he must be a uncertified knave. What statement would work?

References

[1] S. R. Lay, *Analysis: with an introduction to proof*, 4th ed., Pearson Education, Upper Saddle River, NJ, 2005.

[2] E. R. Scheinerman, *Mathematics: A discrete introduction*, 3rd ed., Brooks/Cole, Boston, MA, 2013.

[3] R. M. Smullyan, *The Gödelian puzzle book*, Dover, Mineola, NY, 2013.