

**MATH 300. INTRODUCTION TO  
MATHEMATICAL REASONING.**

**FALL 2015.**

**WEEK 10 (LECTURE 18-19).**

**PEANO'S AXIOMS. METHOD OF  
MATHEMATICAL INDUCTION.**

1. Reading: Section 2.4 and Lecture Notes.
2. Home assignment (Due Monday, November 9) (to submit).

Problems at Sect.2.4: 5(a,b), 6(d,e,g,) 7(a,c,d,g,j,l).

Extra problems:

1. Show that any amount of postage that is an integer number of cents greater than 11 cents can be formed using just 4-cent and 5-cent stamps. (Prove by induction).

2. Explain what is wrong with the following proof by mathematical induction that all horses have the same color. It's true for the set of 1 horse (basic step). Now assume that all horses in any set of  $k$  horses are the same color. Consider a set of  $k+1$  horses, labeled with the integers  $1, 2, 3, \dots, k+1$ . By the induction hypothesis, horses  $1, 2, \dots, k$  are all the same color, as are the horses  $2, 3, 4, \dots, k+1$ . Because these two sets of horses have common members, all  $k+1$  horses must be the same color. This completes the proof.