MATH 3161 Homework Assignment 4

Instructions: Solve and turn in all of the assigned problems, showing ALL steps or reasoning used in your solutions.

Due on Thursday, April 19th at the BEGINNING of class.

p. 24: (Section 1.4) Problems 1(a,b), 5
p. 29-32: (Section 1.5) Problem 6(a,b) (Hint for 6(b): use the fact that Q is dense in R!)

• Prove that if $A$ is finite, $B$ is countable, and $A \cap B = \emptyset$, then $A \cup B$ is countable. (You’ll need to construct a bijection here!)

• Use the previous problem to prove that if $A$ is finite and $B$ is countable, then $A \cup B$ is countable.

• Prove that if $A$ is finite, then there exists a countable set $B$ so that $A \subseteq B$. (This problem is kind of silly)

• Use the previous problem to prove that if $A_1, A_2, \ldots$ are all finite, then their union $\bigcup_{n \in \mathbb{N}} A_n$ is finite or countable. (Hint: can you “expand” each $A_n$ to a bigger countable set?)