Math 161—Writing Assignment 04

*Due: Sunday September 30—5:00*PM

Getting Started

1. Get the template for this assignment. Here's how to do it:
   - Go to https://v2.overleaf.com/ (formerly: https://www.sharelatex.com), and **make sure you are logged in**.
   - In a new window, go here:

     https://v2.overleaf.com/read/rspmnrnrvnsc

   - Click on the menu icon in the upper-left and select "Copy Project"
   - When ask for a name, choose something like "Math 161 - WA 04" and click "Copy"
   - When this completes you will be back in your own workspace (instead of mine).
   - After solving the problem(s), type them up using the template.
   - Email me your final draft.
2. Let me know if you have any questions!

1. Let $\mathcal{L} = \{1, +, <\}$ where 1 is a constant, $+$ is a binary function symbol, and $<$ is a binary relation symbol. Define

   $$\sigma :\equiv (\forall x)(\exists y)[(x < y) \to (x + 1 \neq y)].$$

   Prove that there exist $\mathcal{L}$-structures $\mathcal{M}$ and $\mathcal{N}$ such that $\mathcal{M} \vDash \sigma$ and $\mathcal{N} \nvDash \sigma$.

   Note: this is essentially Problem 1.7.1 #4. Your proof should be a careful construction of the two structures $\mathcal{M}$ and $\mathcal{N}$ together with proofs that $\mathcal{M}$ models σ while $\mathcal{N}$ does not. Remember, proving $\mathcal{N} \nvDash \sigma$ is the same as proving $\mathcal{N} \vDash (\neg\sigma)$.

You will see in the template that I got you started, but please feel free to write it up differently.