Week 8

Exercises on first order models

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1. Prove the following (tip: try first to prove $\neg(\neg\varphi \wedge \neg\psi) \vdash_{CPL} (\varphi \vee \psi)$. To do so, you will need to prove two different contradiction in two different branches, and then a final third contradiction connecting all the branches):

$$\vdash_{CPL} \neg(\neg\varphi \wedge \neg\psi) \rightarrow (\varphi \vee \psi)$$

2. Check if the models given at the end of the notes satisfies the other two sub-formulas of the formula given:
   a) $\mathcal{M} \models \forall y[A(y, x)]$;
   b) $\mathcal{M} \models \forall y[A(z, x)]$.

3. Build another model $\mathcal{N}$ that does not satisfy the formulas above BUT satisfies the other sub-formula:
   a) $\mathcal{N} \not\models \forall y[A(y, x)]$;
   b) $\mathcal{N} \not\models \forall y[A(z, x)]$;
   c) $\mathcal{N} \models \exists x[A(z, c)]$.