The exercises consist of exercise for *Computational Logic* (*CL* for short) and *Automated Theorem Proving* (*ATP* for short). The exercises for *CL* can be found in Fitting's book. The exercises for *ATP* can be found in the lecture notes. Only marked exercises will be discussed.

- 2.8.6 (*CL*)
- 3.1.1 (*CL*)
- Consider the clause set:

  $$\mathcal{C}_1 = \{\mathsf{P}(a), \neg\mathsf{P}(x) \vee \mathsf{P}(\mathsf{f}(x)), \neg\mathsf{P}(\mathsf{f}(x)) \vee \mathsf{Q}(y), \neg\mathsf{Q}(\mathsf{g}(x,x))\} \ .$$

  1. Provide a Herbrand interpretation $\mathcal{I}$ that falsifies the set $\mathcal{C}_1$, that is $\mathcal{I} \not\models \mathcal{C}_1$.
  2. Does there exists a Herbrand model for $\mathcal{C}_1$?

- Consider the clause set:

  $$\mathcal{C}_2 = \{\mathsf{P}(x) \vee \mathsf{Q}(\mathsf{f}(a)), \neg\mathsf{P}(x) \vee \mathsf{Q}(x), \mathsf{P}(\mathsf{f}(x)) \vee \neg\mathsf{Q}(y), \neg\mathsf{P}(x) \vee \neg\mathsf{Q}(\mathsf{f}(\mathsf{a}))\} \ .$$

  Give a closed semantic tree for $\mathcal{C}_2$.

- Consider the clause set:

  $$\mathcal{C}_3 = \{\mathsf{P}(x, \mathsf{f}(x)), \neg\mathsf{P}(\mathsf{a}, \mathsf{f}(x)) \vee \mathsf{R}(x), \neg\mathsf{R}(x)\} \ .$$

  Give a closed semantic tree for $\mathcal{C}_3$.

- Consider the clause set:

  $$\mathcal{C}_4 = \{\mathsf{P}(\mathsf{h}(x, \mathsf{h}(\mathsf{a}, \mathsf{b}))), \neg\mathsf{P}(\mathsf{h}(x, x))\} \ .$$

  Give a closed semantic tree for $\mathcal{C}$. (*ATP*)