Solution — Homework 1

Question 1:

1. \( T_1 = \pi_{\text{model}}(\sigma_{\text{speed} \geq 133}(PC)) \cup \pi_{\text{model}}(\sigma_{\text{speed} \geq 133}(\text{Laptop})) \) — this gives us the list of computers whose speed is at least 133.

2. \( T_2 = \pi_{\text{maker, model}}(\text{Product} \triangleright \bowtie T_1) \) — this gives us the list of makers and computer models where (i) the model is produced by the maker; and (ii) the model’s speed is at least 133.

3. \( T_3 = \pi_{\text{maker}}(\sigma_{\text{maker} = \text{maker1} \land \text{model} \neq \text{model1}}(T_2 \times T_2[\text{maker1, model1}])) \) — gives us the list of makers who produce at least two computers with speed at least 133.

Question 2:

1. \( T_1 = \pi_{\text{model, speed}}(PC) \cup \pi_{\text{model, speed}}(\text{Laptop}) \) — this gives us the list of computers with their corresponding speed.

2. \( T_2 = \pi_{\text{model}}(\sigma_{\text{speed} \prec \text{speed1}}(T_1 \times T_1[\text{model1, speed1}])) \) — this gives us the models which are slower than some other models

3. \( T_3 = \pi_{\text{model}}(T_1) - T_2 \) — this gives us the fastest models

4. \( T_4 = \pi_{\text{maker}}(\text{Products} \triangleright \bowtie T_3) \) — the list of all makers who produce at least one fastest machine