

Aufgabe 2

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Aufgabe 1

1. **RA:** $\pi_{TNR}(T) - \pi_{TNR}(LL)$

TK: $\{ t \mid (\exists u: T(u) \wedge t = u[TNr])$
 $\wedge (\exists k: LL(k))$
 $\wedge (\forall k: LL(k) \rightarrow \neg k[TNr] = u[TNr]) \}$

2. **RA:** $\pi_{PNr}(\sigma_{OrtL \neq OrtP}(LL \bowtie \rho_{OrtL \leftarrow Ort}(L) \bowtie \rho_{OrtP \leftarrow Ort}(P)))$

TK: $\{ t \mid (\exists u: LL(u) \wedge t = u[Pnr])$
 $\wedge (\exists v: L(v) \wedge v[LNr] = u[LNr])$
 $\wedge (\exists k: P(k) \wedge k[PNr] = u[PNr])$
 $\wedge \neg (v[Ort] = k[Ort]) \}$

3. **RA:** $\pi_{PName}((\pi_{PNr, TNR}(LL) \div \pi_{TNR}(T)) \bowtie (P))$

TK: $\{ t \mid (\exists u: P(u) \wedge t = u[PName])$
 $\wedge (\exists k: LL(k) \wedge k[PNr] = u[PNr])$
 $\wedge (\exists v: T(v))$
 $\wedge (\forall v: T(v) \rightarrow v[TNr] = k[TNr]) \}$

Aufgabe 2

$\{ t \mid (\exists u: L(u) \wedge t = u[LName] \wedge \neg u[Ort] = \text{'Marburg'})$
 $\wedge (\exists k: T(k) \wedge k[Gewicht] < 15)$
 $\wedge (\exists v: LL(v) \wedge v[LNr] = u[LNr] \wedge v[TNr] = k[TNr]) \}$

Aufgabe 3

1. $count_{PNr}(\sigma_{Gewicht \geq 50}(T \bowtie LL))$
2. $\tau_{c, LName}(\gamma_{LName, c \leftarrow sum}(Menge)(L \bowtie LL))$
3. $\pi_{Ort}(\sigma_{c < 8}(L \bowtie \gamma_{LNr, c \leftarrow count}(LNr)(LL)))$

4.

$$A_1 = \gamma_{PNr, c \leftarrow count(LNr)}(LL)$$

$$A_2 = \gamma_{PNr, m \leftarrow sum(Menge)}(LL \bowtie (\sigma_{Farbe='Schwarz'}(T)))$$

$$\pi_{PNr}(\sigma_{(m/c > 60)}(A_1 \bowtie A_2))$$