Assignment 5

5.3.1 用 Datalog 写出习题 2.4.1 所有查询。只能使用基本规则，但可以使用与复杂关系代数表达式子表达式对应的若干IDB谓词

(a)

RA:

$$\left.\begin{aligned} R_1 &:= \sigma_{speed \geq 300}(PC) \\ R_2 &:= \pi_{model}(R_1) \\ Answer &:= R_2 \end{aligned}\right\} \Rightarrow Answer := \pi_{model}(\sigma_{speed \geq 300}(PC))$$

Datalog:

$$\left.\begin{aligned} R_1(m,s,r,h,p) &\leftarrow R\_PC(m,s,r,h,p) \text{ AND } s \geq 300 \\ Answer(m) &\leftarrow R_1(m,s,r,h,p) \end{aligned}\right\} \Rightarrow Answer(m) \leftarrow R\_PC(m,s,r,h,p) \text{ AND } s \geq 300$$

(c)

RA:

$$P_{PT}(model, color, PType, price)\ (Printer)$$

$$R_1 := product \bowtie PC$$

$$R_2 := product \bowtie Laptop$$

$$R_3 := product \bowtie Printer$$

$$R_1' := \pi_{model,price}(\sigma_{maker=B}(R_1))$$

$$R_2' := \pi_{model,price}(\sigma_{maker=B}(R_2))$$

$$R_3' := \pi_{model,price}(\sigma_{maker=B}(R_3))$$

$$R\_result := R_1' \cup R_2' \cup R_3'$$

$$Answer := R\_result$$

$$\Rightarrow$$

$$P_{PT}(model, color, PType, price)\ (Printer)$$

$$Answer := \pi_{model,price}(\sigma_{maker=B}(product \bowtie PC)) \cup \pi_{model,price}(\sigma_{maker=B}(product \bowtie Laptop)) \cup \pi_{model,price}(\sigma_{maker=B}(product \bowtie Printer))$$

Datalog:

$R_1(ma, mo, t, s, r.h, p) \leftarrow R_p(ma, mo, t)$ AND $RPC(mo, s, r.h, p)$

$R_2(ma, mo, t, s, r.h, sc, p) \leftarrow R_p(ma, mo, t)$ AND $RL(mo, s, r.h, sc, p)$

$R_3(ma, mo, t, c, p) \leftarrow R_p(ma, mo, t)$ AND $RP(mo, c, t, p)$

$R_4(m, p) \leftarrow R_1(ma, mo, t, s, r.h, p)$ AND $ma = B$

$R_5(m, p) \leftarrow R_2(ma, mo, t, s, r.h, sc, p)$ AND $ma = B$

$R_6(m, p) \leftarrow R_3(ma, mo, t, c, p)$ AND $ma = B$

$Result(m, p) \leftarrow R_4(m, p)$

$Result(m, p) \leftarrow R_5(m, p)$

$Result(m, p) \leftarrow R_6(m, p)$

$Answer(m, p) \leftarrow Result(m, p)$

(e)

RA:

$R_1 := product \bowtie PC$

$R_2 := product \bowtie Laptop$

$R_1' := \pi_{maker}(R_1)$

$R_2' := \pi_{maker}(R_2)$

$R_3 := R_2' - R_1'$

$Answer := R_3$

$\Rightarrow Answer :=$

$\pi_{maker}(product \bowtie Laptop) - \pi_{maker}(product \bowtie PC)$

Datalog:

$R_1(ma, mo, t, s, r, h, p) \leftarrow R_p(ma, mo, t)$ AND $RPC(mo, s, r, h, p)$

$R_2(ma, mo, t, s, r, h, sc, p) \leftarrow R_p(ma, mo, t)$ AND $RL(mo, s, r, h, sc, p)$

$R_3(ma) \leftarrow R_1(ma, mo, t, s, r, h, p)$

$R_4(ma) \leftarrow R_2(ma, mo, t, s, r, h, sc, p)$

$Answer(ma) \leftarrow R_4(ma)$ AND NOT $R_3(ma)$

(g)

RA:

$\rho_{LaptopB(Model, Speed, Ram, Hd, Screen, Price)}(Laptop)$

$R_1 = Laptop\ B \times Laptop$

$R_2 = \sigma_{Speed = speed\ AND\ Ram = ram\ AND\ Model > model}(R_1)$

$Answer = \pi_{Model, model}(R_2)$

Datalog:

$R_1(mo, s, r, h, sc, p, Mo, S, R, H, Sc, P) \leftarrow RL(mo, s, r, h, sc, p)$ AND $RLB(Mo, S, R, H, Sc, P)$

$R_2(mo, s, r, h, sc, p, Mo, S, R, H, Sc, P) \leftarrow R_1(mo, s, r, h, sc, p, Mo, S, R, H, Sc, P)$ AND $S = s$ AND $R = r$ AND $M > m$

$Answer(M, m) \leftarrow R_2(mo, s, r, h, sc, p, Mo, S, R, H, Sc, P)$