CS 334 Database System
ps02

1.

a) $\Pi_{model\_no}(\sigma_{speed \geqslant 3.00}(PCs))$

b) $\Pi_{company}(\sigma_{hd>=1000}(PCs) \bowtie Manufacturers)$

c) $\Pi_{model\_no, price}(\sigma_{company="Samsung"}(PCs \times Smartphones \bowtie Manufacturers))$

d) $\Pi_{company}(\sigma_{device\_type="PC"}(Manufacturers)) - \Pi_{company}(\sigma_{device\_type="smartphones"}(Manufacturers))$

e) $\Pi_{r1.hd}(\sigma_{r1.hd=r2.hd \wedge r1.model \neq r2.model}(\rho_{r1}(PCs) \times \rho_{r2}(PCs))$

f) $\Pi_{sp1.model, sp2.model}(\sigma_{sp1.speed=sp2.speed \wedge sp1.ram=sp2.ram \wedge sp1.model>sp2.model}(\rho_{sp1}(Smartphones) \times \rho_{sp2}(Smartphones))$

g) Reasonably assuming different types of devices have different model numbers.

$\rho_{temp}((\Pi_{model}(\sigma_{speed \geqslant 3.00}(PCs) \cup \Pi_{model}(\sigma_{speed \geqslant 3.00}(Smartphones)) \bowtie Manufacturers)$

$\Pi_{company}(\sigma_{temp.company=temp2.company \wedge temp.model \neq temp2.model}(temp \times \rho_{temp2}(temp))$

h)

$\rho_{all}(\Pi_{model, speed}(PCs) \cup \Pi_{model, speed}(Smartphones))$

$\Pi_{company}(Manufacturers \bowtie (\Pi_{model}(all) - \Pi_{model}(\sigma_{a1.speed<a2.speed}(\rho_{a1}(all) \times \rho_{a2}(all)))))$

2.

a) $temp \leftarrow \Pi_{isbn}(\sigma_{publisher="McGraw-Hill"}(books))$

$\Pi_{name}(member \bowtie borrowed \bowtie temp)$

b) $temp \leftarrow \Pi_{isbn}(\sigma_{publisher="McGraw-Hill"}(books)$

$temp2 \leftarrow \sigma_{count>5}({}_{memb\_no}\mathcal{G}_{distinct-count(isbn)}(borrowed \bowtie temp))$

$\Pi_{name, memb\_no}(temp2 \bowtie member)$

c) $temp \leftarrow memeber \bowtie borrowed \bowtie (\sigma_{publisher="McGraw-Hill"}(books))$

$\Pi_{name}(\sigma_{count(isbn)>5}(({}_{memb\_no}\mathcal{G}_{count-distinct(isbn)}(temp))))$

d) $temp \leftarrow memeber \bowtie borrowed \bowtie books$

$\Pi_{publisher, name, memb\_no}(\sigma_{count(isbn)>5}(({}_{publisher, memb\_no}\mathcal{G}_{count-distinct(isbn)}(temp))))$