

# CSCI 3278 Homework 1

William Christie SID: 810915676

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2.4.1 parts (a-e).

a) What PC models have a speed of at least 3.00?

$R(m, s, r, h, p) := \sigma_{speed \geq 3.00}(PC)$   
 $Answer(model) := \pi_{model}(R)$

model
1005
1006
1013

b) Which manufacturers make laptops with hard disk of at least 100GB?

$R(m, s, r, h, p) := \sigma_{hd \geq 100}(Laptop)$   
 $S := Product \bowtie (R)$   
 $Answer(maker) := \pi_{maker}(S)$

maker
E
A
B
F
G

c) Find the model number, price of all products made by manufacturer B.

$R(m) := \sigma_{maker=B}(Product)$   
 $S(m, p) := \pi_{model,price}(PC) \cup \pi_{model,price}(Laptop) \cup \pi_{model,price}(Printer)$   
 $Answer(model, price) := \pi_{model,price}(R \bowtie S)$

model	price
1004	649
1005	630
1006	1049
2007	1429

d) Find the model numbers of all color laser printers.

$R(m, c, t, p) := \sigma_{type=laser \wedge color=true}(Printer)$   
 $Answer(model) := \pi_{model}(R)$

model
3003
3007

e) Find the manufacturers that sell Laptops, but not PC's.

$R(m, m, t) := \sigma_{type=Laptop}(Product)$   
 $S(m, m, t) := \sigma_{type=PC}(Product)$   
 $Answer(maker) := \pi_{maker}(R) - \pi_{maker}(S)$

maker
F
G

#### 2.4.5

The natural join of R and S gives us all joined tuples of R and S with collapsed common attributes. In contrast, the theta join with condition C of R and S is in fact the cross product of R and S with selected tuples that satisfy condition C. Therefore, we will have two copies of tuples with common attributes, due to the fact that  $S.A = R.A$  and  $R.A = S.A$

#### 2.4.7

a)  $R \cup S$

	Tuples	Reasoning
max	$(m + n)$	no common attributes, no attribute collapse
min	$\min(m, n)$	all attributes the same, but $m < n$ or $n < m$

b)  $R \bowtie S$

	Tuples	Reasoning
max	$\min(m, n)$	all attributes the same where $m < n$ or $n < m$
min	0	no common attributes

c)  $\sigma_C(R) \times S$ , for some condition C

	Tuples	Reasoning
max	$m \times n$	all attributes in R fulfill C, then cross product with S
min	0	no attributes in R fulfill C

d)  $\pi_L(R) - S$ , for some list of attributes L.

	Tuples	Reasoning
max	$\min(m, n)$	List of attributes condition fulfilled, but no elements of S are in $\pi_L(R)$
min	0	List of attributes condition fulfilled, and all elements of S are in $\pi_L(R)$