Santa Jose State University
Department of Computer Science
Database Management Systems - I (CS 157A)
Homework #1 (5 pts)

<u>Questions on Chapter (2)</u>:

Please answer the following questions:

- **Q1 [1.5 pts]:** How many different ways (considering orders os tuples and attributes) are there to represent a relation instance if that instance has [1.5 pts]:

  o Three attributes and three tuples?

  o Four attributes and five tuples?

  o N attribues and m tuples?

- **Q2 [1.5 pts]:** Assume a database with the following Schema:
  Product(maker, model, type)
  PC(model, speed, ram, hd, price)　　　← hd: hard disk
  Laptop(model, speed, ram, hd, screen, price)
  Printer(model, color, type, price)
  Below are sample data for the above tables:

model	speed	ram	hd	price
1001	2.66	1024	250	2114
1002	2.10	512	250	995
1003	1.42	512	80	478
1004	2.80	1024	250	649
1005	3.20	512	250	630
1006	3.20	1024	320	1049
1007	2.20	1024	200	510
1008	2.20	2048	250	770
1009	2.00	1024	250	650
1010	2.80	2048	300	770
1011	1.86	2048	160	959
1012	2.80	1024	160	649
1013	3.06	512	80	529

Sample data for relation PC

model	speed	ram	hd	screen	price
2001	2.00	2048	240	20.1	3673
2002	1.73	1024	80	17.0	949
2003	1.80	512	60	15.4	549
2004	2.00	512	60	13.3	1150
2005	2.16	1024	120	17.0	2500
2006	2.00	2048	80	15.4	1700
2007	1.83	1024	120	13.3	1429
2008	1.60	1024	100	15.4	900
2009	1.60	512	80	14.1	680
2010	2.00	2048	160	15.4	2300

Sample data for relation Laptop

maker	model	type
A	1001	pc
A	1002	pc
A	1003	pc
A	2004	laptop
A	2005	laptop
A	2006	laptop
B	1004	pc
B	1005	pc
B	1006	pc
B	2007	laptop
C	1007	pc
D	1008	pc
D	1009	pc
D	1010	pc
D	3004	printer
D	3005	printer
E	1011	pc
E	1012	pc
E	1013	pc
E	2001	laptop
E	2002	laptop
E	2003	laptop
E	3001	printer
E	3002	printer
E	3003	printer
F	2008	laptop
F	2009	laptop
G	2010	laptop
H	3006	printer
H	3007	printer

model	color	type	price
3001	true	ink-jet	99
3002	false	laser	239
3003	true	laser	899
3004	true	ink-jet	120
3005	false	laser	120
3006	true	ink-jet	100
3007	true	laser	200

Sample data for Product   Sample data for relation Printer

Write expressions of relational algebra to answer the following queries [1.5 pts]:

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

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

c) Find the model number and price of all products (of any type) made by manufacturer B?

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

e) Find those manufacturers that sells laptops but not PC's?

f) Find those hard disk sizes that occur in two or more PC's?

- Q3 [2 pts]: For the above schema <product, PC, Laptop, Printer> tables, express the following constraints. Also, for the data samples given above, indicate any violations to your constraints [2 pts]:
  a) A PC with a processor speed < 2.00 must not sell for more than $500?
  b)A laptop with a screen size < 15.4" must have at least a 100 GB Hard Disk or sell for less than $1,000?
  c) No manufacturer of PC's may also make laptops?
  d) A manufacturer of a PC must also make a laptop with at least as great a processor speed?