

Problem 1

- 2.2.1 a) The attributes of relation Accounts:
 acctNo, Type, balance
 The attributes of relation Customers:
 firstName, lastName, idNo, account

- 2.2.1. b) The Tuples of relation Accounts:

(12345, savings, 12000)
 (23456, checking, 1000)
 (34567, savings, 25)

The Tuples of relation Customers:

(Robbie, Banks, 901-222, 12345)
 (Lena, Hand, 805-333, 12345)
 (Lena, Hand, 805-333, 23456)

- 2.2.1 d) Accounts(acctNo, type, balance)
 Customers(firstName,lastName,idNo,account)

- 2.2.1 f) Accounts(acctNo:integer, type:string, balance:integer)
 Customers(firstName:string, lastName:string, idNo:string, account:integer)

Problem 2

- 2.4.1 a) $\pi_{model}(\sigma_{speed \geq 3.00}(PC))$

Result = 1005, 1006, 1013

- 2.4.1 b) $\pi_{maker}(\sigma_{hd \geq 100}(Laptop) \bowtie (Product))$

Result = E, A, B, F, G

- 2.4.1 c)

$\pi_{model,price}(\sigma_{maker='B'}(Product \bowtie PC) \cup \sigma_{maker='B'}(Product \bowtie Laptop) \cup \sigma_{maker='B'}(Product \bowtie Printer))$

Result =

Model	Price
1004	649
1005	630
1006	1049
2007	1429

- 2.4.1 d) $\pi_{model}(\sigma_{color='true' \text{ AND } type='laser'}(Printer))$

Result = 3003, 3007

- 2.4.1 e) $\pi_{maker}(\sigma_{type='laptop'}(Product)) - \pi_{maker}(\sigma_{type='pc'}(Product))$

Result = F,G

Problem 3

2.4.3 a) $\pi_{class, country}(\sigma_{bore \geq 16}(Classes))$

Result =

Class	Country
Iowa	USA
North Carolina	USA
Yamato	Japan

2.4.3 b) $\pi_{name}(\sigma_{launched < 1921}(Ships))$

Result = Haruna, Hiei, Kirishima, Kongo, Ramillies, Renown, Repulse, Resolution, Revenge, Royal Oak, Royal Sovereign, Tennessee

2.4.3 c) $\pi_{ship}(\sigma_{battle='Denmark Strait' AND result='sunk'}}(Outcomes))$

Result = Bismarck, Hood

2.4.3 d) $\pi_{name}(\sigma_{displacement \geq 35000 AND launched > 1921}(Classes \bowtie Ships))$

Result = Iowa, North Carolina, Yamato, Missouri, Wisconsin, New Jersey, Washington, Musashi

2.4.3 e) $\pi_{name, displacement, numGuns}((Classes \bowtie (Ships \bowtie (\sigma_{ship = name}(\sigma_{battle = 'Guadalcanal'}}(Outcomes))))))$

Result =

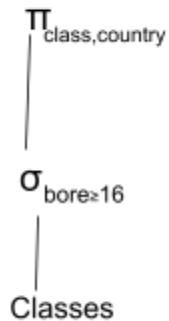
name	displacement	numGuns
Kirishima	32000	8
Washington	37000	9

2.4.3 f) $\rho_{(name)}(\pi_{ship}(Outcomes)) \cup \pi_{name}(Ships)$

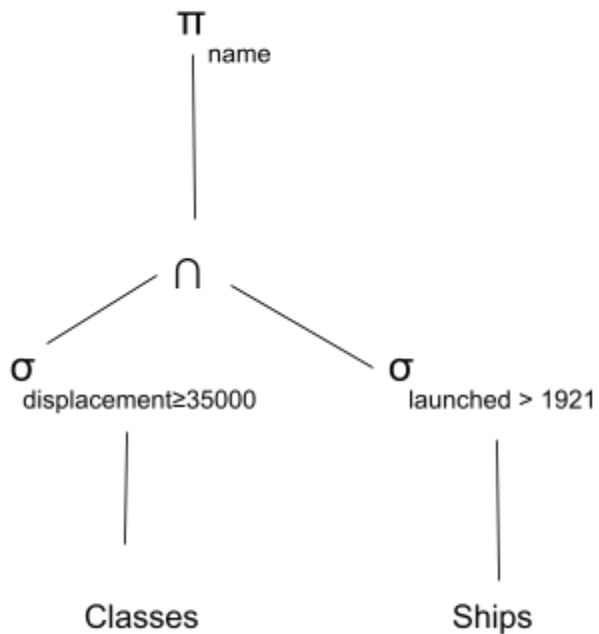
Result = California, Haruna, Hiei, Iowa, Kirishima, Kongo, Missouri, Musashi, New Jersey, North Carolina, Renown, Repulse, Resolution, Revenge, Royal Oak, Royal Sovereign, Tennessee, Washington, Wisconsin, Yamato, Arizona, Bismarck, Duke of York, Fuso, Hood, King George V, Prince of Wales, Rodney, Scharnhorst, South Dakota, West Virginia, Yamashiro.

Problem 4

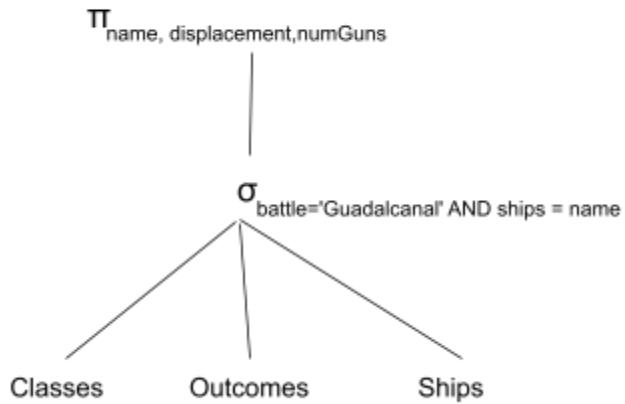
2.4.4 a)



2.4.4 d)



2.4.4 e)



2.4.4 f)

