Date:
Name 1:
Name 2:

Answer the following questions in both relational algebra and
SQL. The SQL must match the Relational Algebra. You can only
use the operators discussed in class today.

Assume the following schema:

Classes(class, type, country, numGuns, bore, displacement)
Ships(ship, class, launched)
Battles(battle, date)
Outcomes(ship, battle, result)

a) For every ship in Ships, list how many battles it has participated
in.

$$\gamma_{ship, count(x)}(S \bowtie_L B)$$

Select ship, count(x) from
S NATURAL LEFT JOIN B;

b) For every battle in Battles, how many more ships survived
(result = 'ok') than were sunk (result = 'sunk')?

For this question we will assume that every battle had sunk & survived.

$$Su = \gamma_{battle, count(x) \to sunk} \sigma_{outcome = 'sunk'} B$$

$$OK = \gamma_{battle, count(x) \to ok} \sigma_{outcome = 'ok'} B$$

solving the general case is a good exercise..

$$\Pi_{battle, ok - su} SU \bowtie OK$$

WITH   SU AS (SELECT battle, count(x) as sunk FROM Battles
              group by battle),
WITH   OK AS (SELECT battle, count(x) as ok FROM Battles
              group by battle)
SELECT battle, ok - su from OK NATURAL JOIN su;