**Writing Queries and Relational Algebra**

**Instructions:** Using relational algebra, write the statements to implement the following queries based on the relations provided below. For your convenience, you can copy/paste the sigma, pi, join, and union symbols from here **(σ π ⋈, ⋃)**. To reduce the length of your statements, you may also use **S, B, and R as aliases for your relations**.

1. List only the name and rating for all Sailors.
   1. Π name, rating (Sailors)
2. List all sailor information for sailors with a rating>8).
   1. σ rating>8(Sailors)
3. List the boat id for boats all red boats.
   1. Π boat\_id(σ color=’red’(Boats))
4. List the boat id for all red boats and all green boats.
   1. Π boat\_id(σ color = ‘red’(Boats)) U Π boat\_id(σ color = ‘green’(Boats))
5. List the name of every sailor who is aged 16 or under.
   1. Π name (σ age <= 16 (Sailors))
6. List the name and rating for all sailors who have a rating of 7 and below.
   1. Π name, rating (σ rating <= 7 (Sailors))
7. Count the number of reservations for boat number 4.
   1. Π COUNT(\*) (σ boat\_id = 4 (Reservations))
8. Find the names of sailors who have reserved boat 103.
   1. Π name (σ boat\_id = 103 (Reservations ⋈ Sailors))
9. Find the names of sailors who have reserved a red boat.
   1. Π S.name (σ B.color = ‘red’ (Reservations ⋈ (σ B.Color = ‘red’ (Boats) ⋈ Sailors)))
10. Find the colors of the boats reserved by Lubber.
    1. Π B.color (σ S.Name = ‘Lubber’ (Sailors ⋈ Reservations ⋈ Boats))
11. Find the names of sailors who have reserved a red and green boat.
    1. Π S.name (σ B.color = ‘Red’ ^ B.color = ‘Green’ (Boat ⋈ Reservations ⋈ Sailors))
12. Find the names of sailors with age over 20 who have not reserved a red boat.
    1. Π S.name (σ S.age > 20 ^ B.color ~ ‘red’ (Sailors ⋈ Reservations ⋈ Boats))