Marking Scheme:

ALG Query: 3 marks
TRC Query: 3 marks
Result: 2 marks
Total: 80 marks

1. Get name of boat that "Lastname" reserves.

ALG>

T1:= Project S# (select name='Your lastname' (Sailor))

T2:= (T1 njoin Reservation) njoin Boat;

Project name (T2);

TRC>

{B.name| B in Boat and (exists R in Reservation, S in Sailor) (R.S#=S.S# and R.B#=B.B# and S.name='Your Lastname')};

Result:
Freedom

2. Get sailer names for sailers who reserve Paradise.

ALG>

T1:= Project B#(select name='Paradise' (Boat));

T2:= T1 njoin Reservation njoin Sailor

Project name (T2);

TRC>

{S.Name|S in Sailor and exists (R in Reservation, B in Boat) (R.S#=S.S# and R.B#=B.B# and B.name='Paradise')};

Result:
Smith
Jones
Blake

3. Get sailer names for sailers who do not reserve any boat.

ALG>

T1:= Project Name (Sailor);

T2:=Project Name (Reservation njoin Sailor);

T1 minus T2

TRC>

{S.Name|S in Sailor and not (exists R in Reservation) (R.S#=S.S#)};

Or

{S.Name|S in Sailor and (forall R in Reservation) (R.S# <> S.S#)};

Result:
Adams

4. Get all pairs of sailer names such that the sailers concerned reserve the same boats.
ALG:
R1(name1, B#):=Project name, B# (Reservation njoin sailor);
R2 (name2, B#):=Project name, B# (Reservation njoin sailor);
T1:=Project name1, name2 (R1 njoin R2);
Select name1<>name2 (T1)
TRC:
{S.name, S'.name |S in sailor and S' in sailor and (exists R in Reservation and R' in Reservation and B in Boat) (R.S#=S.S# and R.B#=R'B# and R'.S#=S'.S# and S.S#<>S'.S#)}

Result:

Name1	name 2
Smith	Jones
Smith	Blake
Smith	Last Name
Jones	Smith
Jones	Blake
Jones	Lastname
Blake	Smith
Blake	Jones
Blake	Lastname
Lastname	Smith
Lastname	Jones
Lastname	Blake

5. Get sailer names for sailers who reserve all boats.
ALG>

T1:= project B# (Boat);
T2:= project S#, B# (Reservation);

```
T3:= T2 divideby T1;
T4:= Sailors njoin T3;
project name (T4);
```

TRC>

```
{S.Name | S in Sailer  and (forall B in Boat) (exists R in Reservation)(S.S# =R.S# and R.B# = B.B#)};
```

Result:
Smith

6. Get sailer names for sailers who reserve all boats except Splendor.
ALG:

```
ALG
T1:= project S#, B# (Resevation);
T2:= project B# (select name < > 'Splendor' (Boat));
T3:= T1 divideby T2;
T4:= select name = 'Splendor' (Boat)
T5:= project S# (Reservation njoin T4)
T6:= T3 minus T5;
project name (Sailor njoin T6);
```

TRC:

```
{S.Name | S in Sailor and (forall B in Boat)
    (B.Name = 'Splendor' and not (exists R in Reservation) (S.S# = R.S# and R.B# = B.B#))
    or
    (B.Name < > 'Splendor ' and (exists R in Reservation) (S.S# = R.S# and R.B# = B.B#))};
```

Result:
Jones

7. Get sailer names for sailers who reserve all boats that Lastname reserves.
(Highlighted condition is optional.)
ALG:

```
T1:= project B# ( select Name = 'LastName'(Sailor) njoin Reservation);
T2:= project B#,S# (Reservation);
T3:= T2 divideby T1;
project name ( select Name != 'LastName'(T4 njoin Sailer));
```

TRC:

```
{ S'.name| S' in Sailor and S'.name != 'Lastname' and (Exists S in Sailor) (S.name='Lastname' and
(For all B in Boat)
((exists R in Reservation) (R.S#=S.S# and R.B#=B.B#) and
(exists R' in Reservation) (R'.S#=S'.S#  and R'.B#=B.B#)
Or
Not ( exists R in Reservation)(R.S#=S.S# and R.B#=B.B#)))}
```

Result:
Smith

Jones
Blake

Or (without the optional condition)
Result:
Smith
Jones
Blake
Lastname

8. Get sailer names for sailers who reserve only the boats that Lastname reserves
(Highlighted condition is optional.)
ALG:
T1:= Project B# (select Name = 'Lastname' (Sailor) njoin Reservation) ;
T2:= Project B# (Boat) minus T1;
T3:= Project S# (T2 njoin Reservation) ;
T4:= project B#, S# (Reservation) / T1;
T5:= T4 – T3;
Project Name (select Name != 'Lastname'(T5 njoin Sailor));

TRC:
{ S'.name| S' in Sailor and S'.name != 'Lastname' and (Exists S in Sailor) (S.name='Lastname' and
(For all B in Boat)((exists R in Reservation) (R.S#=S.S# and R.B#=B.B#) and
(exists R' in Reservation) (R'.S#=S'.S# and R'.B#=B.B#)
Or
not (exists R in Reservation)(R.S#=S.S# and R.B#=B.B#) and
not (exists R' in Reservation) (R'.R#=S'.S# and R.B#=B.B#))}

Result:

Or (without the optional condition)
Result:
Lastname

9. Get sailer names and the number of boats they reserve.
ALG>
Aggregate name, Count (B#) (Sailor njoin Reservation);

TRC:
{ S.name, Count (R.B#)| S in Sailor and R in Reservation and S.S#=R.S#}

Result:

Name	Count(B#)
Smith	4
Jones	3
Blake	2
Lastname	1

10. Get sailer names for sailers who reserve more than two boats.

ALG>

T1:= Sailor njoin Reservation;

T2(name, count):= Aggregate name, count (B#) (T1)

Project name (select count>2 (T2));

TRC:

T(name, count): = {S.Name, count (R.B#) | S in Sailor and R in Reservation and S.S# = R.S#};

{S.name | S in T and S.count > 2};

Result:

Smith

Jones

Or

{S.Name | S in Sailor and exits (R1 in Reservation, R2 in Reservation) (S.S# = R1.S# and S.S# = R2.S# and R1.S# <> R2.S#)};

Result:

Smith

Jones

Blake