

Solution 1 - Formulate the following queries in SQL.

- a) Find the details of all of reefs which have recorded a temperature-reading above 22 degrees.

```
SELECT *  
FROM REEF  
WHERE reefname IN (  
    SELECT reefname  
    FROM REEFTEMP  
    WHERE temperaturereading > 22)
```

- b) Find the details of all reefs which have recorded a temperature-reading below the average temperature-reading across all reefs.

```
SELECT DISTINCT *  
FROM REEF, REEFTEMP  
WHERE REEF.reefname = REEFTEMP.reefname  
AND temperaturereading < (  
    SELECT AVG(temperaturereading)  
    FROM REEFTEMP)
```

- c) Find names of all reefs that do not have a sample of a coral with name including "Button".

```
SELECT reefname  
FROM REEF  
WHERE reefname NOT IN (  
    SELECT reefname  
    FROM CORALSAMPING  
    WHERE coralcode IN (  
        SELECT coralcode  
        FROM CORAL  
        WHERE LIKE "%button%"))
```

- d) Find the coral that has the highest thermal-threshold.

```
SELECT coralname  
FROM CORAL  
WHERE thermalthreshold >= ALL (  
    SELECT thermalthreshold  
    FROM CORAL)
```

Solution 2 - Formulate the following queries in SQL.

- a) Retrieve the names of corals which are in ALL reefs.

```
SELECT coralname
FROM CORAL AS A
WHERE NOT EXISTS (
    SELECT *
    FROM REEF AS B
    WHERE NOT EXISTS (
        SELECT *
        FROM CORALSAMPLING AS C
        WHERE A.coralcode = C.coralcode AND B.reefname = C.reefname))
```

- b) List reef(s) that have at least all the corals that the reef "Wreck Is." has.

```
SELECT *
FROM REEF AS X
WHERE NOT EXISTS (
    SELECT *
    FROM CORALSAMPLING
    WHERE reefname = "Wreck Is" AND coralcode IN (
        SELECT coralcode
        FROM CORALSAMPLING AS Y
        WHERE X.reefname = Y.reefname))
```

Alternate solution:

```
SELECT *
FROM REEF AS X
WHERE NOT EXISTS (
    SELECT *
    FROM CORALSAMPLING AS Y
    WHERE reefname = "Wreck Is." AND NOT EXISTS (
        SELECT *
        FROM CORALSAMPLING AS Z
        WHERE Z.coralcode = Y.coralcode and Z.reefname = X.reefname))
```

(Solution continues onto next page.)

Alternate solution:

```
SELECT *
FROM CORALSAMPLING
WHERE coral code IN (
    SELECT coralcodes
    FROM CORALSAMPLING
    WHERE reefname= "Wreck Is.")
GROUP BY reefname
HAVING COUNT (*) = (
    SELECT COUNT (distinct coralcodes)
    FROM CORALSAMPLING
    WHERE reefname = "Wreck Is.")
```