

**SOLUTION**

```

FLIGHTS      (flight_num, source_city, destination_city)
DEPARTURES  (flight_num, date, plane_type)
PASSENGERS  (passenger_id, passenger_name, passenger_address)
BOOKINGS    (passenger_id, flight_num, date, seat_number)

```

**a)**

**Find the passenger\_id of all passengers who have a seat booked on a plane of type "747" from San Francisco to Washington. Do not return any duplicate values.**

```

SELECT DISTINCT B.passenger_id
FROM Flights F, Departures D, Bookings B
WHERE B.flight_num = D.flight_num
AND B.date = D.date
AND F.flight_num = D.flight_num
AND F.source_city = "San Francisco"
AND F.destination_city = "Washington"
AND D.plane_type = "747";

```

*Since key of Departures is flight\_num and date, you need both of these to do the join and find out what type of plane the passenger is booked on.*

*We can also write the above using NATURAL JOIN*

```

SELECT DISTINCT B.passenger_id
FROM Flights F, Departures D NATUAL INNER JOIN Bookings
B AS A
WHERE F.flight_num = A.flight_num
AND F.source_city = "San Francisco"
AND F.destination_city = "Washington"
AND A.plane_type = "747";

```

**b)**

**Find the cities that have direct (non-stop) flights to both Honolulu and Newark**

```

SELECT DISTINCT source_city
FROM Flights F
WHERE F.dest_city = "Honolulu"
AND F.source_city IN
  (SELECT source_city
   FROM Flights F2
   WHERE dest_city = "Newark");

```

*Could also be done with a selfjoin on Flights, or with INTERSECT, or..., just can't use a simple selection with "AND" in the Where clause --- this would return no tuples*

```

SELECT DISTINCT source_city
FROM Flights F1, Flights F2
WHERE F1.dest_city = "Honolulu"
AND F2.dest_city = "Newark"
AND F1.source_city = F2.source_city;

```

Or

```
SELECT DISTINCT source_city
FROM Flights F
WHERE F1.dest_city = "Honolulu"
INTERSECT
SELECT DISTINCT source_city
FROM Flights F
AND F.dest_city = "Newark";
```

c)

**Find the flight\_num and date of all flights for which there are no reservations.**

```
SELECT flight_num, date
FROM Departures D
WHERE NOT EXISTS
  (SELECT *
   FROM Bookings B
   WHERE B.flight_num = D.flight_num
   AND B.date = D.date);
```

*Alternately here we could have used EXCEPT clause and taken the difference of Departures and Bookings.*

d)

**Find the passenger\_name of all passengers who have a seat booked on at least one plane of every type.**

```
SELECT DISTINCT passenger_name
FROM Passengers P
WHERE
  (SELECT COUNT(DISTINCT D.plane_type)
   FROM Departures D, Bookings B
   WHERE D.flight_num = B.flight_num
   AND D.date = B.date
   AND B.passenger_id = P.passenger_id)
  =
  (SELECT COUNT(DISTINCT D.plane_type)
   FROM Departures D);
```

*Alternatively:*

```
SELECT DISTINCT P.passenger_name
FROM Passengers P
WHERE NOT EXISTS
  (SELECT D.plane_type
   FROM Departures D
   WHERE NOT EXISTS
     (SELECT *
      FROM Departures D2, Bookings B
      WHERE D2.flight_num = B.flight_num
```

```
AND D2.date = B.date
AND B.passenger_id = P.passenger_id
AND D.plane_type = D2.plane_type));
```

The first one is easier and does it by counting the number of plane types. The second is trickier but is similar to the technique used in the book.

e)

Print an ordered list of all source cities and the number of distinct destination cities that they have direct (non-stop) flights to. The list should be ordered in decreasing number of destinations and should contain **only those source cities that have flights to 25 or more distinct destinations**.

```
SELECT source_city,
COUNT(DISTINCT destination_city) AS NumDestinations
FROM Flights F
GROUP BY source_city
HAVING NumDestinations >= 25
ORDER BY NumDestinations DESC;
```