

(a)

```
CREATE TABLE Patients
```

```
(
  PatientId VARCHAR2(5) NOT NULL,
  PatientName VARCHAR2(12) NOT NULL,
  Address VARCHAR2(12) NOT NULL,
  DOB Date,
  PRIMARY KEY(PatientId)
);
```

```
CREATE TABLE Rooms
```

```
(
  RoomId VARCHAR2(4) NOT NULL,
  RoomType VARCHAR2(30) NOT NULL,
  CostPerNight NUMBER(5) NOT NULL,
  PRIMARY KEY(RoomId)
);
```

```
CREATE TABLE Admissions
```

```
(
  AdmissionId VARCHAR2(5) NOT NULL,
  PatientId VARCHAR2(5) NOT NULL,
  RoomId VARCHAR2(4) NOT NULL,
  AdmitDate Date,
  DischargeDate Date,
  FOREIGN KEY(PatientId) REFERENCES Patients(PatientId),
  FOREIGN KEY(RoomId) REFERENCES Rooms(RoomId),
  PRIMARY KEY(AdmissionId)
);
```

(b)

```
INSERT INTO Patients
VALUES('HR245', 'John Doe', 'San Fernando', '20-FEB-1981');
INSERT INTO Rooms
VALUES('R311', 'Private with Bathroom', 850);
INSERT INTO Admissions
VALUES('130', 'HR245', 'R311', '05-MAY-2009', null);
INSERT INTO Admissions
VALUES('30', 'HR245', 'R311', '05-MAY-2008', null);
INSERT INTO Admissions
VALUES('4', 'HR215', 'R312', '05-MAY-2008', '15-MAY-2008');
```

(c)

Would apply to both the Patients and Rooms table. There must be matching records for PatientId in Patients and Admissions tables. There also must be matching records for RoomId in Rooms and Admissions tables.

(d)

```
UPDATE Admissions
SET DischargeDate = '06-MAY-2009'
WHERE PatientId = 'HR245';
```

2

```
CREATE TABLE Member
```

```
(
  MemberId VARCHAR2(4) NOT NULL,
  FirstName VARCHAR2(12),
  LastName VARCHAR2(12),
  DateRegistered Date,
  Ranking NUMBER(2),
  PRIMARY KEY(MemberId)
);
```

```
CREATE TABLE Item
```

```
(
  ItemId VARCHAR2(4) NOT NULL,
  MemberId VARCHAR2(4) NOT NULL,
  BasePrice NUMBER(6,2) NOT NULL,
  DateAdded Date,
  DateSold Date,
  PriceSold NUMBER(6,2),
  FOREIGN KEY(MemberId) REFERENCES Member(MemberId),
  PRIMARY KEY(ItemId)
);
```

```
CREATE TABLE Auction
```

```
(
  AuctionId VARCHAR2(4) NOT NULL,
  ItemId VARCHAR2(4) NOT NULL,
  DateStarted Date NOT NULL,
  DateEnded Date,
  AuctionSuccessful VARCHAR2(1),
  FOREIGN KEY(ItemId) REFERENCES Item(ItemId),
  PRIMARY KEY(AuctionId)
);
```

```
CREATE TABLE Bid
```

```
(
  BidId VARCHAR2(4) NOT NULL,
  AuctionId VARCHAR2(4) NOT NULL,
  MemberId VARCHAR2(4) NOT NULL,
  BidAmount NUMBER(6,2),
  BidDate Date,
  FOREIGN KEY(AuctionId) REFERENCES Auction(AuctionId),
  FOREIGN KEY(MemberId) REFERENCES Member(MemberId),
```

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```
PRIMARY KEY(BidId)
);

INSERT INTO Member
VALUES('M102', 'John', 'Smith', '01-JUN-2010', 1); /*row inserted*/

INSERT INTO Member
VALUES('M103', 'Jane', 'Ali', '01-JAN-2008', 1); /*row inserted*/

INSERT INTO Item
VALUES('I100', 'M102', 34.50, '02-JUN-2010', null, null); /*row
inserted*/

INSERT INTO Item
VALUES('I101', 'M103', 34.50, '02-JUN-2010', null, null); /*row
inserted*/

INSERT INTO Item
VALUES('I100', 'M103', 34.50, '02-JUN-2010', null, null); /*ORA-00001:
unique constraint (SQL_NTKUTUMKWRDXMSJOHRHBVMPIK.SYS_C004960558)
violated ORA-06512: at "SYS.DBMS_SQL", line 1721*/

INSERT INTO Item(DateSold, ItemId, MemberId, BasePrice, DateAdded,
DateSold, PriceSold)
VALUES(null, 'I200', 'M102', 45.00, '03-JUN-2010', null); /*ORA-
00947: not enough values*/

INSERT INTO Auction
VALUES(null, 'I101', '04-JUN-2010', null, null); /*ORA-01400: cannot
insert NULL into
("SQL_NTKUTUMKWRDXMSJOHRHBVMPIK"."AUCTION"."AUCTIONID") ORA-06512: at
"SYS.DBMS_SQL", line 1721*/

INSERT INTO Auction
VALUES('A145', 'I101', '06-JUN-2010', null, null); /*row inserted*/

INSERT INTO Bid(BidId, AuctionId, MemberId, BidAmount, BidDate)
VALUES(12, 'A123', 'M102', 35.00, '07-JUN-2010'); /*ORA-02291:
integrity constraint (SQL_ZCJCCNHJLXJQCXSZONHPCYQJX.SYS_C005202167)
violated - parent key not found ORA-06512: at "SYS.DBMS_SQL", line
1721*/

INSERT INTO Bid(AuctionId, BidId, MemberId, BidAmount, BidDate)
VALUES('A145', null, 'M103', 37.00, '12-JUN-2010'); /*ORA-01400:
cannot insert NULL into
("SQL_NTKUTUMKWRDXMSJOHRHBVMPIK"."BID"."BIDID") ORA-06512: at
"SYS.DBMS_SQL", line 1721*/
```

(a)

```
SELECT CustomerName, Address
FROM Customer
WHERE Customer.CustomerType = 'Company';
```

(b)

```
SELECT sc.CenterLocation, dc.DeliveryStatus
FROM ShippingCenter sc, DeliveryStatus dc
WHERE sc.ShippingCenterId = dc.DeliveryStatus
```

(c)

Closure occurs when relational operations are applied to one or more tables to produce a new table. The closure property allows the output from one operation to become the input to another. Thus, it allows nested operations. The Restrict, Project or Join operations would act as an example with a description of the tables or attributes involved.

(d)

Project =  $\Pi$  (note: I use the word Join here but you must use the  $\Pi$  symbol)

Restrict =  $\sigma$  (note: I use the word Join here but you must use the  $\sigma$  symbol)

Join (note: I use the word Join here but you must use the  $\bowtie$  symbol)

```
 $\Pi_{\text{RecipientName, DeliveryStatus}}(\sigma_{\text{DeliveryStatus='ON ROUTE'}}(\sigma_{\text{RecipientName='MARY KING'}}(\text{Package JOIN}_{\text{TrackingNumber}} \text{PackageDelivery})))$ 
```