PL/SQL

1. Create Professor1 Table to have an address included as an object

```
CREATE TYPE address_typ AS OBJECT
(StreetNo NUMBER(10), StreetName VARCHAR2(100), AptNo NUMBER(5), City
VARCHAR2(100), State VARCHAR2(100), ZipCode NUMBER(9), Country VARCHAR2(100));

CREATE TYPE professor_t AS OBJECT
(name VARCHAR2(20), address address_typ);

CREATE TABLE Professor1 of professor_t;

INSERT INTO Professor1 VALUES ('John Adams', address_typ(380, 'Richard Street', '301',
'Buffalo','NY', 14201, 'USA'));

SELECT * FROM Professor1;
```

	NAME	ADDRESS
1	John Adams	[SYSTEM.ADDRESS_TYP]

2. Create Professor2 Table to contain a circular object type

```
CREATE TYPE professor2_t AS OBJECT(
   Name VARCHAR2(20),
   Colleague REF professor2_T
);

CREATE TABLE professor2 OF professor2_t;

INSERT INTO professor2(Name)
VALUES('Joe');

INSERT INTO professor2
SELECT 'Bob', REF(M) FROM professor2 M
WHERE Name = 'Joe';

UPDATE professor2
SET Colleague = (
   SELECT REF(M)
   FROM professor2 M
```

```
   WHERE M.Name = 'Bob')
WHERE Name = 'Joe';
```

	NAME	COLLEAGUE
1	Joe	[SYSTEM.PROFESSOR2_T]
2	Bob	[SYSTEM.PROFESSOR2_T]

3. Based on your observations explain what is REF

REF is a pointer to a piece of data identified as an object. A reference can be established between an object and a table or an attribute in a table.

4. Add an attribute to show the number courses a professor is teaching in the professor object and then use PL/SQL and write a procedure to increase the number of courses a professor is teaching.

First adding attribute noOfCourses to Professor1 and filling the data:

```
CREATE TYPE address_typ AS OBJECT
(StreetNo NUMBER(10), StreetName VARCHAR2(100), AptNo NUMBER(5), City
VARCHAR2(100), State VARCHAR2(100), ZipCode NUMBER(9), Country VARCHAR2(100));

CREATE TYPE professor_t AS OBJECT
(name VARCHAR2(20), noOfCourses NUMBER(30), address address_typ);

CREATE TABLE Professor1 of professor_t;

INSERT INTO Professor1 VALUES ('John Adams',5, address_typ(380, 'Richard Street', '301',
'Buffalo','NY', 14201, 'USA'));
INSERT INTO Professor1 VALUES ('Mike Goodman',6, address_typ(80, 'Carlton Street', '501',
'NewYork','NY', 10001, 'USA'));
```

	NAME	NOOFCOURSES	ADDRESS
1	John Adams	5	[SYSTEM.ADDRESS_TYP]
2	Mike Goodman	6	[SYSTEM.ADDRESS_TYP]

PL/SQL Code to increase the noOfCourses by 1 for Professor 'Mike Goodman' :

```
DECLARE
```

```
  no_of_courses NUMBER(8,2);

  PROCEDURE change_quantity (
    no_courses IN OUT NUMBER,
    add_more NUMBER
  ) IS
  BEGIN
    no_courses := no_courses + add_more;
  END;

BEGIN
  SELECT noOfCourses INTO no_of_courses
  FROM Professor1
  WHERE name = 'Mike Goodman';

  DBMS_OUTPUT.PUT_LINE('Before invoking procedure, no_of_courses: ' || no_of_courses);

  change_quantity(no_of_courses, 1);

  DBMS_OUTPUT.PUT_LINE('After invoking procedure, no_of_courses: ' || no_of_courses);

  UPDATE Professor1 SET noOfCourses = no_of_courses WHERE name = 'Mike Goodman';

END;
/
```

Dbms Output:

```
Before invoking procedure, no_of_courses: 6
After invoking procedure, no_of_courses: 7
```

SELECT * FROM Professor1;

	NAME	NOOFCOURSES	ADDRESS
1	John Adams	5	[SYSTEM.ADDRESS_TYP]
2	Mike Goodman	7	[SYSTEM.ADDRESS_TYP]

Remarks: The noOfCourses for Mike Goodman was successfully increased by 1.