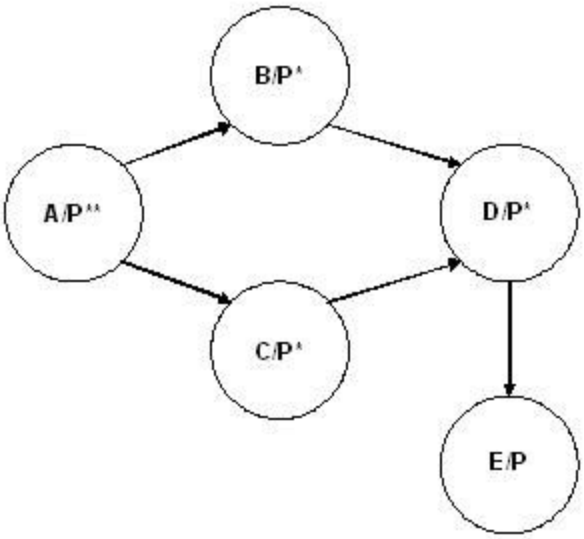
CSC 540 Spring 2019 - HOMEWORK 6 - SOLUTIONS

Problem 1



Above is a grant diagram involving users A through D and a single privilege P.
Suppose A executes
REVOKE P FROM C CASCADE
Compute the resulting grant diagram. Then, tell which of the following is a consequence of the revocation?

Correct choices:

Correct Choice 1: Both B and D have privilege P, but C doesn't
Correct Choice 2: B has privilege P
Correct Choice 3: D has privilege P
Correct Choice 4: E has privilege P
Correct Choice 5: The revocation is accepted by the system, but neither B, D, nor E lose privilege P

Incorrect choices:

Incorrect Choice 1: D no longer has privilege P
Incorrect Choice 2: E no longer has privilege P
Incorrect Choice 3: B no longer has privilege P

Incorrect Choice 4: A no longer has privilege P
Incorrect Choice 5: The revocation is rejected by the system, and all privileges remain as they were
Incorrect Choice 6: D retains privilege P, but without the grant option
Incorrect Choice 7: C and E do not have privilege P, but B and D do

Problem 2

In order to execute the following SQL statement:

```
UPDATE S
SET c = 'New York'
WHERE a IN (SELECT a FROM R) AND
EXISTS (SELECT b FROM T WHERE T.a > S.a);
```

Which of the following privileges is not useful in allowing the above statement to be executed? To be precise, say a privilege P is useful if there is some set of other privileges such that the statement cannot be executed with just those privileges, but if we add privilege P, then the statement can be executed.

Correct choices:

Correct Choice 1: UPDATE on S(a)
Correct Choice 2: EXISTS on T
Correct Choice 3: INSERT on S(a)
Correct Choice 4: INSERT on S
Correct Choice 5: REFERENCES on R

Incorrect choices:

Incorrect Choice 1: UPDATE on S
Incorrect Choice 2: UPDATE on S(c)
Incorrect Choice 3: SELECT on S
Incorrect Choice 4: SELECT on S(a)
Incorrect Choice 5: SELECT on T(b)
Incorrect Choice 6: SELECT on T(a)
Incorrect Choice 7: SELECT on T
Incorrect Choice 8: SELECT on R(a)
Incorrect Choice 9: SELECT on R

Problem 3

The relation R(x) consists of a set of integers --- that is, one-component tuples with an integer component.
Alice's transaction is a query:

```
SELECT SUM(x)
FROM R;
COMMIT;
```

Betty's transaction is a sequence of inserts:

```
INSERT INTO R VALUES(10);
INSERT INTO R VALUES(50);
INSERT INTO R VALUES(70);
COMMIT;
```

Carol's transaction is a sequence of deletes:

```
DELETE FROM R WHERE x=70;
DELETE FROM R WHERE x=50;
COMMIT;
```

Before any of these transactions execute, the sum of the integers in R is 5000, and none of these integers are 10, 50, or 70. If Alice's, Betty's, and Carol's transactions run at about the same time, and each runs under isolation level READ COMMITTED, which of these sums could be produced by Alice's transaction?

Correct choices:

Correct Choice 1: 5000
Correct Choice 2: 5130
Correct Choice 3: 5010
Correct Choice 4: 5080

Incorrect choices:

Incorrect Choice 1: 5020
Incorrect Choice 2: 5050
Incorrect Choice 3: 4940
Incorrect Choice 4: 5070
Incorrect Choice 5: 4990
Incorrect Choice 6: 5060
Incorrect Choice 7: 5120

Problem 4

Consider the following transactions:
R: [X := X + 15; Y := Y - 10]
S: [X := X - 5; Y := X + 5]
T: [X := X * 2; Y := Y * 3]
Assuming initial values of X = 10 and Y = 20, which of the following is a possible state of the database resulting from a serializable execution of R, S and T?

Correct choices:

Correct Choice 1: X = 40; Y = 75
Correct Choice 2: X = 45; Y = 50
Correct Choice 3: X = 40; Y = 0
Correct Choice 4: X = 25; Y = 20
Correct Choice 5: X = 30; Y = 35
Correct Choice 6: X = 30; Y = 10

Incorrect choices:

Incorrect Choice 1: X = 25; Y = 0
Incorrect Choice 2: X = 25; Y = 10
Incorrect Choice 3: X = 25; Y = 35
Incorrect Choice 4: X = 25; Y = 50
Incorrect Choice 5: X = 25; Y = 75
Incorrect Choice 6: X = 30; Y = 0
Incorrect Choice 7: X = 30; Y = 20
Incorrect Choice 8: X = 30; Y = 50
Incorrect Choice 9: X = 30; Y = 75
Incorrect Choice 10: X = 40; Y = 10
Incorrect Choice 11: X = 40; Y = 20
Incorrect Choice 12: X = 40; Y = 35
Incorrect Choice 13: X = 40; Y = 50
Incorrect Choice 14: X = 45; Y = 0
Incorrect Choice 15: X = 45; Y = 10
Incorrect Choice 16: X = 45; Y = 20
Incorrect Choice 17: X = 45; Y = 35
Incorrect Choice 18: X = 45; Y = 75