STAT 37820

HW 1

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Part 1. Database creation and modification

Q2. Create two non-trivial queries, each should retrieve data from multiple tables in the database “School”. Note: You may insert additional values in any tables to facilitate your queries.

To facilitate my query, I insert more records into the tests and scores tables so that we end up with 19 unique tests, 11 unique students, and 57 records for scores. Note only a few students showed up in each test based on my construction. I only include the top five new records creation for illustration purpose.

Code

```
INSERT INTO tests VALUES
('2015-8-25', 'T', 30, 3, NULL),
('2015-8-29', 'T', 30, 4, NULL),
('2015-8-29', 'T', 30, 5, NULL),
('2015-8-27', 'Q', 15, 5, NULL),
('2015-8-30', 'T', 30, 5, NULL)

ALTER TABLE scores MODIFY COLUMN student_id INT UNSIGNED AFTER test_id;

INSERT INTO scores VALUES
(1, 1, 9),
(1, 3, 14),
(1, 9, 4),
(2, 3, 5),
(2, 9, 10)
```

Query #1. Which class has the highest and lowest average test scores?

```
SELECT classes.class_id, class_name, AVG(score) FROM classes, tests, scores
WHERE classes.class_id=tests.class_id
```

```
AND tests.test_id=scores.test_id
AND tests.type='T'
GROUP BY classes.class_id
HAVING COUNT(score) IS NOT NULL
ORDER BY -AVG(score);
```

Query #2. Find the name of the student who got the highest average score in Calculus tests (excluding quiz).

```
SELECT students.student_id, CONCAT(last_name, ',', first_name) AS name, AVG(score)
FROM students, scores, tests
WHERE students.student_id=scores.student_id
AND scores.test_id=tests.test_id
AND tests.type='T'
GROUP BY students.student_id
ORDER BY AVG(score);
```

Part 2. More SQL exercises on Sakila database

Q1. Show your code of finding the top five movies that earned the most money for the rental business. Also list the number of times the movies were rent out. Show results.

Code

```
USE sakila;
SHOW TABLES;
SELECT film.film_id, title, SUM(amount) AS revenue,
COUNT(rental.rental_id) AS rent_times, film.rental_rate,
film.rental_rate*COUNT(rental.rental_id) AS direct_rev
FROM film, inventory, rental, payment
WHERE film.film_id=inventory.film_id
AND inventory.inventory_id=rental.inventory_id
AND rental.rental_id=payment.rental_id
GROUP BY film.film_id
ORDER BY -SUM(amount)
LIMIT 5;
```

Output

film_id	title	revenue	rent_times	rental_rate	direct_rev
879	TELEGRAPH VOYAGE	231.73	27	4.99	134.73
973	WIFE TURN	223.69	31	4.99	154.69
1000	ZORRO ARK	214.69	31	4.99	154.69
369	GOODFELLAS SALUTE	209.69	31	4.99	154.69
764	SATURDAY LAMBS	204.72	28	4.99	139.72

Note: The idea is to find out the payment accruing to rentals associated with inventories of a given film. A little complication here arises as we have two variables indicating money earned on each rental. The first is rental_rate in FILM table while the other is payment in RENTAL table. It turns out that rental rate times the number of rentals for a given film rarely coincide with the total payment associated with the same film. This complication is a consequence of overdue charges, which I verified by combining the return and due date with the revenue data. For this reason, the code is written based on total payment rather than rental rate.

Q2. Create a nontrivial query using LEFT JOIN.

```
# Query: Find out films that don't have actors
SELECT film.film_id, title, actor.actor_id, CONCAT(last_name, ',', first_name)
FROM (film LEFT JOIN film_actor ON film.film_id=film_actor.film_id), actor
WHERE actor.actor_id=film_actor.actor_id
ORDER BY film.title;
```

Q3. Create a nontrivial query using correlated sub-query.

```
# Query: How many rentals accrue to movies in the drama categories?
SELECT COUNT(rental.rental_id) FROM rental, inventory, category, film, film_category
WHERE film_category.film_id=film.film_id
AND film_category.category_id=(SELECT category_id FROM category WHERE name='Drama')
AND film.film_id=inventory.film_id
AND inventory.inventory_id=rental.inventory_id;
```

Part 3. Try SAS

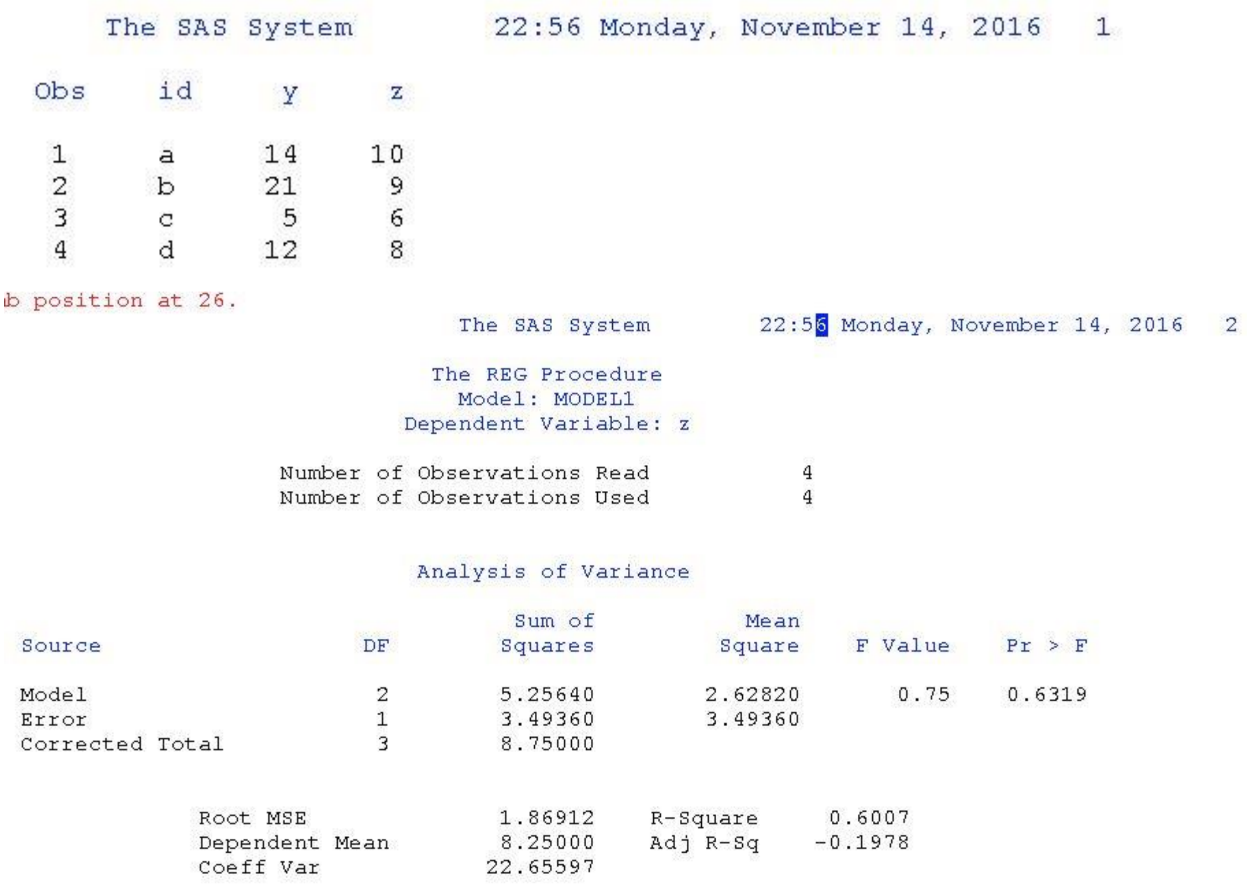
Q1. Create a small program by inputting data and run a few procedures, provide the code and selected output.

Code

```
/* Input the first dataset*/
data dt1;
	infile datalines;
	input id $ x;
	datalines;
a 1.6
b 1.2
c 1.9
d 0.7
;
run;
/*Input the second dataset*/
data dt2;
	infile datalines;
	input id $ y z;
	datalines;
a 14 10
b 21 9
c 5  6
d 12 8
;
run;

/*Output to the right window*/
ods listings;

/*Procedure: sort the two datasets to prepare for merging*/
proc sort data=dt1;
	by id;
```

```
proc sort data=dt2;
	by id;
/*Create a new dataset by merging the two*/
data new;
	merge dt1 dt2;
	by id;
/*Procedure: Show the new dataset*/
proc print; run;

/*Procedure: Run simple linear regression*/
proc reg data=new;
	model z = x y;
run;
```

Output (from screenshots)



```
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  Obs     id      y      z

   1      a      14     10
   2      b      21      9
   3      c       5      6
   4      d      12      8
```

```
ib position at 26.
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                        The REG Procedure
                          Model: MODEL1
                      Dependent Variable: z

                 Number of Observations Read           4
                 Number of Observations Used           4


                       Analysis of Variance

                                     Sum of          Mean
Source                   DF         Squares        Square    F Value    Pr > F

Model                     2         5.25640       2.62820       0.75    0.6319
Error                     1         3.49360       3.49360
Corrected Total           3         8.75000


           Root MSE              1.86912    R-Square     0.6007
           Dependent Mean        8.25000    Adj R-Sq    -0.1978
           Coeff Var            22.65597
```

```
                              The REG Procedure
                                Model: MODEL1
                            Dependent Variable: z

                             Parameter Estimates

                            Parameter       Standard
Variable        DF          Estimate          Error     t Value     Pr > |t|

Intercept        1           5.10975        4.84711        1.05       0.4832
x                1           0.29684        2.33626        0.13       0.9195
y                1           0.21073        0.18441        1.14       0.4577

       The SAS System        22:56 Monday, November 14, 2016   4

Obs      id      x      y      z

  1      a     1.6     14     10
  2      b     1.2     21      9
  3      c     1.9      5      6
  4      d     0.7     12      8
```