

STAT:5400 Computing in Statistics
Fall 2018
Final Exam

- You may submit a text file containing all of your SAS code and output as well as your response to the database question.
- You may run SAS either under Linux or on the Virtual Desktop.
- SAS output may be submitted either as part of your text document, or as a separate pdf, text, or html file produced directly from SAS.
- You do not have to work on Linux, although you may.
- You may use notes, computer files, on-line resources; in short, anything except other people!

1 SAS

1. Read the dataset `Leinhard.dat` from the course Datasets into SAS. Read the `Leinhard.cbk` file so you know what the columns are.
2. Use a line in SAS to suppress the automatic inclusion of the date on SAS output.
3. Produce the table given at the end of the paper. Use SAS macro functions to include the time and date in the title. (Your time and date will be different from my example.)
4. Then use the SAS procedures of your choice to produce a listing that shows the mean per capita income by region for oil-producing countries only.

```
options linesize = 72 nodate ;
```

```
data Leinhard ;  
infile "/mnt/nfs/clasnetappvm/homepage/kcowles/Datasets/Leinhard.dat" ;  
    length country $24. ;  
    input country pci infmort region $ oil $ ;  
run ;
```

```
proc print data = Leinhard ;  
run ;
```

```
proc tabulate data = Leinhard format = 7.2;  
class region oil ;  
var pci infmort ;  
tables region * (oil all) all, (pci infmort) * (n*f=3.0 mean stddev)/  
rtspace = 22;  
label pci= "Per capita income" infmort = "Infant mortality rate"  
    region = "Region" oil = "Oil producer";  
    title "Report produced at &systemtime on &sysdate" ;  
  
run ;
```

```
proc tabulate data = Leinhard ;
class region ;
var pci ;
tables region, pci * mean ;
where oil = "yes" ;
run ;
```

* could also use proc sql or proc means for the last part

2 Relational database concepts

An administrator in a collegiate dean's office wishes to store information about the merit staff working in the various departments in the college. Merit staff have titles such as Secretary, Administrator, and Clerk.

Notes:

- The same merit staff person may work in up to 4 departments.
- A merit staff person may have only one title in each department in which he or she works.
- A merit staff person working in more than one department may have the same or different titles in those departments.
- A merit staff person working in more than one department will have only one email address but may have a different phone number for each department.
- Obviously the same department may employ more than one merit staff person.
- DEOs are not merit staff.

Below are the data items that the person in the dean's office wishes to store. Devise a relational database structure to represent these data in third normal form. Add any needed data items. Indicate any primary and foreign keys.

Staff last name
Staff first name
Staff email
Department name 1
Department main office building and room number 1
Department DEO name 1
Staff title 1
Staff phone 1
Department name 2
Department main office building and room number 2
Department DEO name 2
Staff title 2
Staff phone 2
Department name 3
Department main office building and room number 3
Department DEO name 3
Staff title 3
Staff phone 3
Department name 4
Department main office building and room number 4
Department DEO name 4
Staff title 4
Staff phone 4

Departments table

Department abbreviation PK
Department name
Department DEO
Department main office building and room number

Staff person table

Person I.D. PK
Person last name
Person first name
Person email

Linking table

Department abbreviation FK
Person I.D. FK
Title
Phone

Primary key is combination of Department abbreviation and Person I.D.

Report produced at 19:07 on 13DEC18

		Per capita income			Infant mortality rate		
		N	Mean	StdDev	N	Mean	StdDev
Region	Oil producer						
Africa	no	31	182.58	179.41	31	141.73	46.37
	yes	3	1210.00	1561.44	3	148.10	132.31
	All	34	273.24	514.32	34	142.29	54.94
Americas	Oil producer						
	no	21	958.43	1416.98	20	54.13	32.75
	yes	2	745.00	700.04	2	65.10	18.95
	All	23	939.87	1360.65	22	55.12	31.59
Asia	Oil producer						
	no	26	603.31	1013.08	24	74.73	85.48
	yes	4	870.00	652.53	3	267.70	334.61
	All	30	638.87	968.15	27	96.17	137.46
Europe	Oil producer						
	no	18	3040.22	1439.28	18	19.26	10.47
	All	18	3040.22	1439.28	18	19.26	10.47
All		105	998.07	1416.71	101	89.05	90.80

	pci
	Mean

region	
Africa	1210.00
Americas	745.00
Asia	870.00