

Rene Zamudio

Exercise 1

I first imported the three data sets.

Part a:

```
/*(a) How many students took STAT550 and STAT484? What were their  
grades in these courses? List their id's and respective grades. */
```

```
proc sql;  
  select count(*) label 'Students Count'  
  from (select a.id, a.grade, b.grade  
        from grades484 as a, grades550 as b  
        where a.id=b.id);  
quit;  
  
proc sql;  
  select a.id, a.grade label 'STAT484 Grade',  
        b.grade label 'STAT550 Grade'  
  from grades484 as a, grades550 as b  
  where a.id=b.id  
  order by a.id;  
quit;
```

Output: 13 students took STAT550 and STAT484.

The SAS System

Students Count

13

The SAS System

ID	STAT484 Grade	STAT550 Grade
384	A	A
495	B	B
2272	B	A
3406	A	A
3598	B	B
5310	C	B
6056	A	A
6346	A	A
6718	A	A
7756	A	A
8219	B	B
8266	A	A
8991	B	B

Part b:

```
/* (b) How many students took STAT550 and STAT695? What were their
grades in these courses? List their id's and respective grades. */
```

```
proc sql;
  select count(*) label 'Students Count'
  from (select a.id, a.grade, b.grade
        from grades550 as a, grades695 as b
        where a.id=b.id);
quit;

proc sql;
  select a.id, a.grade label 'STAT550 Grade',
        b.grade label 'STAT695 Grade'
  from grades550 as a, grades695 as b
  where a.id=b.id
  order by a.id;
quit;
```

Output: 12 students took STAT550 and STAT695.

The SAS System

Students Count

12

The SAS System

ID	STAT550 Grade	STAT695 Grade
477	A	A
1401	A	B
1455	A	A
1841	A	A
3406	A	A
3528	A	A
3572	A	B
4852	A	A
5310	B	B
5967	A	A
7577	A	A
7756	A	A

Part C:

/* (c) How many students took STAT484 and STAT695? What were their grades in these courses? List their id's and respective grades. */

```
proc sql;
  select count(*) label 'Students Count'
    from (select a.id, a.grade, b.grade
          from grades484 as a, grades695 as b
          where a.id=b.id);
quit;

proc sql;
  select a.id, a.grade label 'STAT484 Grade',
         b.grade label 'STAT695 Grade'
    from grades484 as a, grades695 as b
    where a.id=b.id
    order by a.id;
quit;
```

Output: 6 students STAT484 and STAT695.

The SAS System

Students Count

6

The SAS System

ID	STAT484 Grade	STAT695 Grade
2267	A	A
3406	A	A
5310	C	B
6306	A	A
7756	A	A
8407	A	A

Part d:

```
/* (d) How many students took all three courses? What were their grades
in these courses? List their id's and respective grades. */
```

```
proc sql;
  select count(*) label 'Students Count'
    from (select a.id, a.grade, b.grade, c.grade
          from grades484 as a, grades550 as b,
               grades695 as c
          where a.id=b.id=c.id);
quit;

proc sql;
  select a.id, a.grade label 'STAT484 Grade',
         b.grade label 'STAT550 Grade', c.grade label 'STAT695 Grade'
    from grades484 as a, grades550 as b,
         grades695 as c
   where a.id=b.id=c.id
   order by a.id;
quit;
```

Output: 3 students took all three courses.

The SAS System

Students Count

3

The SAS System

ID	STAT484 Grade	STAT550 Grade	STAT695 Grade
3406	A	A	A
5310	C	B	B
7756	A	A	A

Exercise 2

Part a:

```
/* (a) How many patients were in the study? */  
proc sql;  
  select count(distinct id) as PatientCount from glaucoma;  
quit;
```

Output: There are 26 patients in the study.

The SAS System

PatientCount
26

Part b:

```
/* (b) How many patients were currently on medication? How many were  
currently off medication or medication-naïve (never took medication)? */  
proc sql;  
  select count(distinct id) as PatientCount  
    from glaucoma  
   where No_of_meds>0;  
  select count(distinct id) as PatientCount  
    from glaucoma  
   where Time_previously__on_meds_yrs=0 or No_of_meds=0;  
quit;
```

Output: 17 patients were currently on medication. 9 patients were currently off medication or medication-naïve.

The SAS System

PatientCount
17

The SAS System

PatientCount
9

Part c:

```
/* (c) What were the mean, standard deviation, min, and max of the time  
previously on medication? Exclude medication-naïve patients. */  
proc sql;  
  select mean(Time_previously__on_meds_yrs) format 5.2 as mean,  
         std(Time_previously__on_meds_yrs) format 5.2 as std,  
         min(Time_previously__on_meds_yrs) format 3. as min,  
         max(Time_previously__on_meds_yrs) format 3. as max  
    from glaucoma  
   where group='Tx' and Time_previously__on_meds_yrs > 0;  
quit;
```

Output: Mean = 10.9, std = 7.65, min, = 1, max = 28

The SAS System

mean	std	min	max
10.90	7.65	1	28

Part d:

```
/* (d) How many males and how many females were in the study? */  
proc sql;  
  select gender, count(distinct id) as GenderCount  
    from glaucoma  
   group by gender;  
quit;
```

Output: There are 8 females and 18 males.

The SAS System

Gender	GenderCount
	0
F	8
M	18

Part e:

```
/* (e) How many patients were in the study by type of glaucoma? */  
proc sql;  
  select type_of_glaucoma, count(distinct id) as TypeCount  
    from glaucoma  
   group by type_of_glaucoma;  
quit;
```

Output: 10 POAG. 12 normotensive, 3 pigmentary, and 1 traumatic.

The SAS System

Type of glaucoma	TypeCount
	0
POAG	10
normotensive	12
pigmentary	3
traumatic	1

Part f:

```
/* (f) What was the mean age by gender and type of glaucoma? */  
proc sql;  
  select gender, type_of_glaucoma, mean(age) as MeanAge format 5.2  
    from glaucoma  
   group by gender, type_of_glaucoma;  
quit;
```

Output:

The SAS System

Gender	Type of glaucoma	MeanAge
		.
F	POAG	87.25
F	normotensive	58.50
M	POAG	72.50
M	normotensive	70.88
M	pigmentary	71.67
M	traumatic	72.00

Exercise 3

```
data Ex3;
input empty$;
cards;
.
;

%let fullname=Rene Zamudio;
%let lastname=%scan(&fullname,2);
%put &lastname;

%macro ex3macro;

title "This assignment is completed by &lastname on &sysday, &sysdate at &systime";
%let x=1;
%let count=%eval(&x+&x);
%put &count;

title3 "&x+&x=&count";
proc print data=Ex3 noobs;
run;

%mend;
%ex3macro;
```

Output:

This assignment is completed by Zamudio on Tuesday, 21APR20 at 18:32

1+1=2

empty

Exercise 4

```
%macro LLN(total_length, p);
```

```
data sample;  
do n=1 to &total_length;  
b=rand("Bernoulli", &p);  
sum+b;  
xnbar=sum/n;  
output;  
end;  
keep xnbar n;  
run;
```

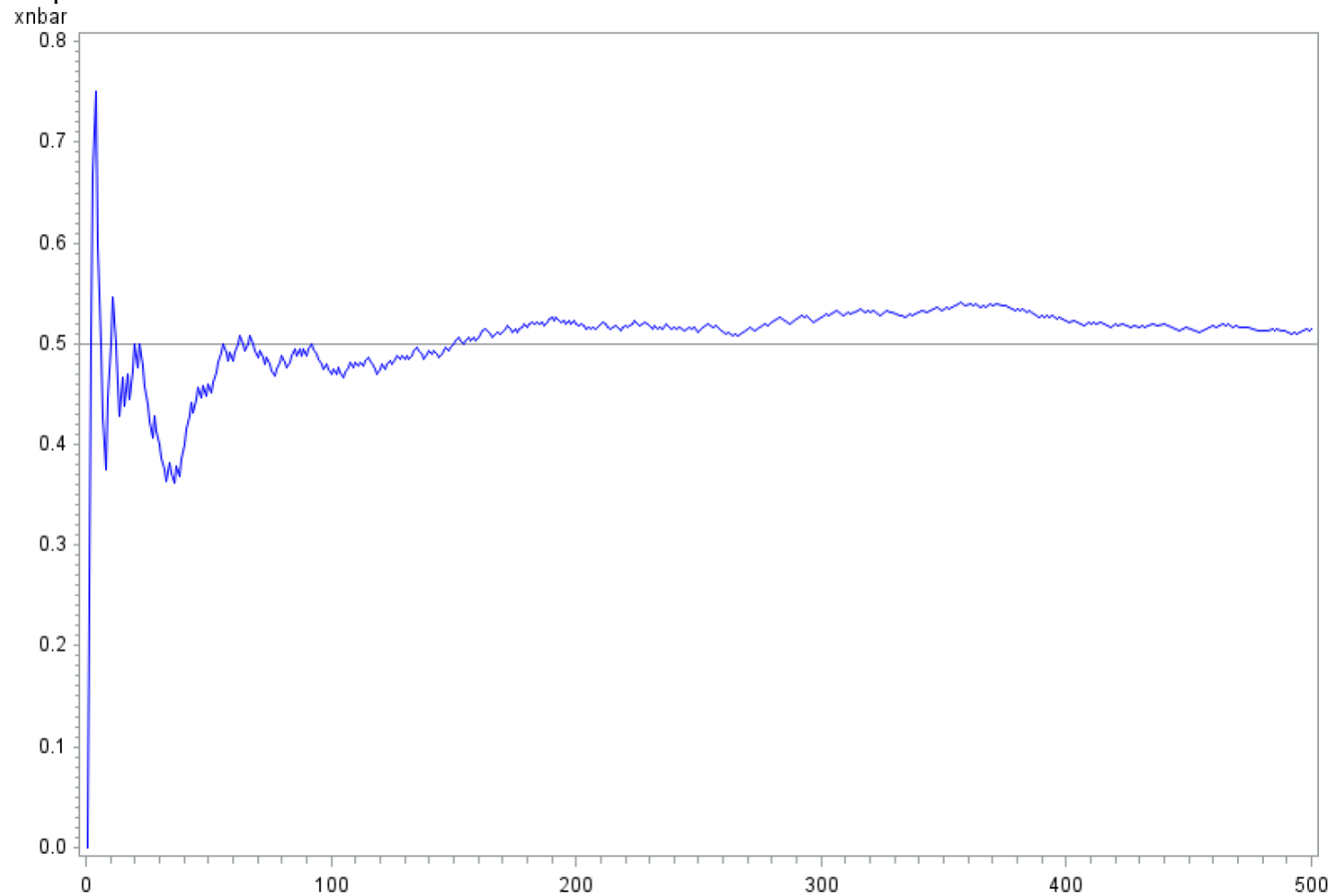
```
proc print data=sample;  
run;
```

```
symbol interpol=join c=blue;  
proc gplot;  
plot xnbar*n/vref=&p;  
run;
```

```
%mend;
```

```
%LLN(500, 0.5);
```

Output:



Exercise 5

```
data pets;
input gender$ pet$10. count;
cards;
boy   cockatiel 1
boy   turtle    3
boy   rabbit     4
girl  cockatiel 2
girl  turtle    3
girl  rabbit     7
;

Title 'Number of Cute Pets Owned by Families of 3rd Graders';

proc format;
value $petsfmt
'cockatiel'='\\Mac\Home\Desktop\Spring 2020\STAT 475\HW\homework4\cockatiel.jpg'
'rabbit'='\\Mac\Home\Desktop\Spring 2020\STAT 475\HW\homework4\rabbit.jpg'
'turtle'='\\Mac\Home\Desktop\Spring 2020\STAT 475\HW\homework4\turtle.jpg';
run;

proc tabulate ;
class gender pet;
classlev gender/s=[foreground=white background=purple just=r postimage=$genderfmt.];
classlev pet/s=[foreground=white background=green just=r postimage=$petsfmt.];
var count;
table gender={s=[foreground=white background=blue just=c]}, pet={s=[foreground=white
background=pink just=c]}*count=' '*sum='/box='# of Pets';
run;
```

Output:

Number of Cute Pets Owned by Families of 3rd Graders			
# of Pets	pet		
	cockatiel	rabbit	turtle
gender			
boy	1.00	4.00	3.00
girl	2.00	7.00	3.00

Exercise 6

/* Exercise 6. Take five points (-3, -2), (0, 4), (2, 8), (4, 12), and (7, 18). Note that these points lie on a perfectly straight line with the intercept a=4 and slope b=2. The quantities a and b can be found as a solution of linear regression equation $y = X\beta + \epsilon$ that is, $\beta = (X'X)^{-1}X'y$ where $y = \{-2, 4, 8, 12, 18\}$ and $X = \{1 \ -3, \ 1 \ 0, \ 1 \ 2, \ 1 \ 4, \ 1 \ 7\}$ is the design matrix. Use proc iml to find a and b. */

```
proc iml;
X = {1 -3, 1 0, 1 2, 1 4, 1 7};
X_inv=inv(X);
X_tr=t(X);
y={-2, 4, 8, 12, 18};
Beta=inv(X_tr*X)*X_tr*y;
a=Beta[1, 1];
b=Beta[2, 1];
print Beta;
print a;
print b;
```

Output:

The SAS System

Beta
4
2

a
4

b
2

Exercise 7

```
data products;
input prodnum prodname $ 7-28 @30 manunum prodtype $ 35-45 @47 rtlcost comma8.;
cards;
5009 Dream Machine          500 Workstation $3,200
4506 Business Machine       450 Workstation $3,345
2101 Travel Laptop          400 Laptop      $2,760
2212 Analog Cell Phone      230 Phone        $35
4509 Digital Cell Phone     245 Phone        $175
5003 Office Phone           560 Phone        $145
1110 Spreadsheet Software   134 Software     $300
1200 Database Software      113 Software     $799
3409 Statistical Software    243 Software    $1,899
2102 Wordprocessor Software 245 Software     $345
2200 Graphics Software      246 Software     $599
;
```

Part a:

```
/* (a) Read instream data */

proc print data=products;
run;
```

Output:

Product Information					
Obs	prodnum	prodname	manunum	prodtype	rtlcost
1	5009	Dream Machine	500	Workstation	3200
2	4506	Business Machine	450	Workstation	3345
3	2101	Travel Laptop	400	Laptop	2760
4	2212	Analog Cell Phone	230	Phone	35
5	4509	Digital Cell Phone	245	Phone	175
6	5003	Office Phone	560	Phone	145
7	1110	Spreadsheet Software	134	Software	300
8	1200	Database Software	113	Software	799
9	3409	Statistical Software	243	Software	1899
10	2102	Wordprocessor Software	245	Software	345
11	2200	Graphics Software	246	Software	599

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Part b:

```
/* (b) Use PROC SQL to insert a new row
prodnum    prodname    manunum    prodtype    rtlcost
3480    Desktop Computer    780    Workstation    $1,799 */
```

```
proc sql;
  insert into products
    values(3480, 'Desktop Computer', 780, 'Workstation', 1799);
  select *
    from products;
quit;
Output:
```

Product Information				
prodnum	prodname	manunum	prodtype	rtlcost
5009	Dream Machine	500	Workstation	3200
4506	Business Machine	450	Workstation	3345
2101	Travel Laptop	400	Laptop	2760
2212	Analog Cell Phone	230	Phone	35
4509	Digital Cell Phone	245	Phone	175
5003	Office Phone	560	Phone	145
1110	Spreadsheet Software	134	Software	300
1200	Database Software	113	Software	799
3409	Statistical Software	243	Software	1899
2102	Wordprocessor Software	245	Software	345
2200	Graphics Software	246	Software	599
3480	Desktop Computer	780	Workstation	1799

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Part c:

/* (c) Use PROC SQL to modify the data to reflect a 20% price increase on all software products, and a 20% discount on all the other products. */

```
proc sql;
  update products
    set rtlcost=rtlcost*0.8
      where prodtype<>'Software';
  update products
    set rtlcost=rtlcost*1.2
      where prodtype='Software';
  select *
    from products;
quit;
```

Output:

Product Information				
prodnum	prodname	manunum	prodtype	rtlcost
5009	Dream Machine	500	Workstation	2560
4506	Business Machine	450	Workstation	2676
2101	Travel Laptop	400	Laptop	2208
2212	Analog Cell Phone	230	Phone	28
4509	Digital Cell Phone	245	Phone	140
5003	Office Phone	560	Phone	116
1110	Spreadsheet Software	134	Software	360
1200	Database Software	113	Software	958.8
3409	Statistical Software	243	Software	2278.8
2102	Wordprocessor Software	245	Software	414
2200	Graphics Software	246	Software	718.8
3480	Desktop Computer	780	Workstation	1439.2

Part d:

```
/* (d) Use PROC SQL to add title, footnote, labels and modify formats
(if necessary) to obtain the following output (Note that the footnote
contains today's date). */
```

```
proc sql;
title 'Product Information';
footnote "Updated on &sysdate";
select prodnum label='Product Number', prodname label='Product Name',
       manunum
label='Manufacturer Number', prodtype label='Product Type',
       rtlcost label='Retail Unit Cost'
format=dollar8.2
from products;
quit;
```

Output:

Product Information				
Product Number	Product Name	Manufacturer Number	Product Type	Retail Unit Cost
5009	Dream Machine	500	Workstation	\$2560.00
4506	Business Machine	450	Workstation	\$2676.00
2101	Travel Laptop	400	Laptop	\$2208.00
2212	Analog Cell Phone	230	Phone	\$28.00
4509	Digital Cell Phone	245	Phone	\$140.00
5003	Office Phone	560	Phone	\$116.00
1110	Spreadsheet Software	134	Software	\$360.00
1200	Database Software	113	Software	\$958.80
3409	Statistical Software	243	Software	\$2278.80
2102	Wordprocessor Software	245	Software	\$414.00
2200	Graphics Software	246	Software	\$718.80
3480	Desktop Computer	780	Workstation	\$1439.20
Updated on 23APR20				