Exercise-5

Matthew McAvoy

September 8, 2016

```
path <- "C:/Users/homur/OneDrive/New College/EDA/Week 3/Salaries.csv"
salary_data <- read.csv(path, header=TRUE)
```

1.

To look at how salary depends on different variables, we can aggregate them then take their mean, median, or summary which includes the previous items.

```
aggregate(salary ~ rank + sex, salary_data, summary)
```

```
##        rank    sex salary.Min. salary.1st Qu. salary.Median salary.Mean
## 1 AssocProf Female       62880          73680         90560       88510
## 2  AsstProf Female       63100          73000         77000       78050
## 3      Prof Female       90450         109700        120300      122000
## 4 AssocProf   Male       70000          83210         95630       94870
## 5  AsstProf   Male       63900          74380         80180       81310
## 6      Prof   Male       57800         105800        124000      127100
##   salary.3rd Qu. salary.Max.
## 1         103900      109600
## 2          79360       97030
## 3         135000      161100
## 4         104600      126400
## 5          88800       95080
## 6         145500      231500
```

By looking at the summary, we see women make less than men markedly by the median, mean, and max. The largest difference occurs between women full professors and men full professors with a difference of about $70,000.

2.

I will say age is the number of years they have been teaching, here labelled as yrs.service.

```
aggregate(salary ~ yrs.service + rank, salary_data, summary)
```

```
##    yrs.service      rank salary.Min. salary.1st Qu. salary.Median
## 1            1 AssocProf      104800         106600        108400
## 2            5 AssocProf       83900          84650         85400
## 3            6 AssocProf       88650          96200        101200
## 4            7 AssocProf       70000          95440        105100
## 5            8 AssocProf       74830          81650         86610
## 6            9 AssocProf       71060          86160         97890
## 7           10 AssocProf       81500          83850         99250
```

```
## 8          11 AssocProf      103600          103700          103800
## 9          12 AssocProf       95610           95610           95610
## 10         16 AssocProf       82100           82100           82100
## 11         17 AssocProf       81280           81280           81280
## 12         18 AssocProf      113300          113300          113300
## 13         19 AssocProf       86250           86250           86250
## 14         22 AssocProf       62880           73500           84120
## 15         23 AssocProf       74000           78850           83710
## 16         24 AssocProf       73300           73300           73300
## 17         28 AssocProf      106300          106300          106300
## 18         33 AssocProf       88600           88600           88600
## 19         39 AssocProf       70700           70700           70700
## 20         49 AssocProf       81800           81800           81800
## 21         53 AssocProf       90000           90000           90000
## 22          0  AsstProf       72500           77000           81000
## 23          1  AsstProf       63900           72500           72750
## 24          2  AsstProf       73000           79220           80220
## 25          3  AsstProf       68400           73720           77790
## 26          4  AsstProf       74000           79910           86370
## 27          5  AsstProf       74000           82610           91230
## 28          6  AsstProf       63100           63100           63100
## 29          0      Prof      105000          105000          105000
## 30          2      Prof       96540          111400          126300
## 31          3      Prof      117200          125500          133800
## 32          4      Prof      105300          112000          118800
## 33          5      Prof      141100          147200          153300
## 34          6      Prof       93000           94600           96200
## 35          7      Prof       92050          107300          116400
## 36          8      Prof      102000          104900          106100
## 37          9      Prof      106600          111200          116500
## 38         10      Prof      104400          106000          107700
## 39         11      Prof       88180          106400          119500
## 40         12      Prof      101000          121400          130100
## 41         13      Prof      170500          170500          170500
## 42         14      Prof      102200          107600          112600
## 43         15      Prof       95330          109600          124700
## 44         16      Prof      112400          130800          135600
## 45         17      Prof       81700          111500          124300
## 46         18      Prof      101100          120500          127600
## 47         19      Prof       94350          114200          146900
## 48         20      Prof      101000          120000          126600
## 49         21      Prof      117700          120500          135100
## 50         22      Prof       96610          101600          124100
## 51         23      Prof       84270          101900          119100
## 52         24      Prof       93160           93160           93160
## 53         25      Prof      101700          113400          130800
## 54         26      Prof       89560          105200          121200
## 55         27      Prof       91000          108100          139200
## 56         28      Prof       98190          117600          124600
## 57         29      Prof      148500          148500          148500
## 58         30      Prof       92550          103100          122900
## 59         31      Prof       99420          110200          125600
## 60         32      Prof      124300          124300          124300
## 61         33      Prof      128200          145200          162200
```

```
## 62          34      Prof       92390          95160          97920
## 63          35      Prof       87800          99000         100400
## 64          36      Prof       88600          92850         107300
## 65          37      Prof      102600         103900         128000
## 66          38      Prof       93520         129100         143600
## 67          39      Prof      109000         110200         111400
## 68          40      Prof       77200          88710         101000
## 69          41      Prof      141500         141500         141500
## 70          43      Prof       72300         126000         149900
## 71          44      Prof       89650          97320         105000
## 72          45      Prof       67560          97550         127200
## 73          46      Prof      100600         100600         100600
## 74          48      Prof      107200         107200         107200
## 75          49      Prof       78160         105400         132600
## 76          51      Prof       57800          57800          57800
## 77          57      Prof       76840          76840          76840
## 78          60      Prof      192300         192300         192300
##    salary.Mean salary.3rd Qu. salary.Max.
## 1       110600          113600      118700
## 2        85400           86150       86900
## 3        99850          104800      107200
## 4        97650          107000      113600
## 5        90340          100100      119800
## 6        91950          100700      100900
## 7        94470          103800      104000
## 8       111300          115100      126400
## 9        95610           95610       95610
## 10       82100           82100       82100
## 11       81280           81280       81280
## 12      113300          113300      113300
## 13       86250           86250       86250
## 14       84120           94730      105400
## 15       83710           88560       93420
## 16       73300           73300       73300
## 17      106300          106300      106300
## 18       88600           88600       88600
## 19       70700           70700       70700
## 20       81800           81800       81800
## 21       90000           90000       90000
## 22       81630           87250       92000
## 23       74740           76990       86100
## 24       82350           88510       91300
## 25       79710           86020       95080
## 26       85510           92000       92700
## 27       87420           94130       97030
## 28       63100           63100       63100
## 29      105000          105000      105000
## 30      123100          136400      146500
## 31      133800          142100      150500
## 32      118800          125500      132300
## 33      153100          159200      165000
## 34      112000          121500      146800
## 35      129500          129700      204000
## 36      108100          109300      118200
```

```
## 37      128700          120800      183800
## 38      114300          113600      145200
## 39      120400          143900      148800
## 40      126500          135200      145000
## 41      170500          170500      170500
## 42      118600          128800      147300
## 43      128200          137300      166800
## 44      141000          152200      173200
## 45      126100          152500      160400
## 46      137400          149400      194800
## 47      137100          151700      193000
## 48      128600          137000      163200
## 49      138800          153100      170000
## 50      122100          138600      150000
## 51      121300          133300      175000
## 52       93160           93160       93160
## 53      133800          147200      172300
## 54      122600          140700      155500
## 55      129000          146500      163200
## 56      130400          145900      168500
## 57      148500          148500      148500
## 58      118400          134000      138800
## 59      126500          133800      162200
## 60      124300          124300      124300
## 61      160000          175800      189400
## 62       97920          100700      103400
## 63      109000          107300      150400
## 64      108500          119000      137000
## 65      127800          151900      152700
## 66      147300          155100      231500
## 67      111800          113200      115000
## 68      106000          119700      143200
## 69      141500          141500      141500
## 70      144400          168300      205500
## 71      112900          124500      144000
## 72      117400          147100      147800
## 73      100600          100600      100600
## 74      107200          107200      107200
## 75      132600          159800      187000
## 76       57800           57800       57800
## 77       76840           76840       76840
## 78      192300          192300      192300
```

Aggregating on yrs.service didn't help much as there is still data that needs to be compressed before it's easily distinguishable.

3.

```
aggregate(salary ~ discipline + sex, salary_data, summary)
```

```
##   discipline    sex salary.Min. salary.1st Qu. salary.Median salary.Mean
```

```
## 1          A Female       62880          73350          78000       89060
## 2          B Female       71060          97030         105400      111200
## 3          A   Male       57800          87350         105300      110700
## 4          B   Male       67560          94730         113600      118800
##   salary.3rd Qu. salary.Max.
## 1         108500      137000
## 2         127500      161100
## 3         128000      205500
## 4         141300      231500
```

We see females in discipline A have a much lower median and mean salary than other groups. Looking at the cookbook, we see discipline A is theoretical and B is applied. While there is no discernible difference between men and their department, there is a large difference for females.