Noah Tigner

GEOG 495

Exercise 5 – Data Wrangling & Matrix Algebra

1. Average temperatures tend to be lowest in Eugene during the beginning and end of the year. The warmest months observed were June and August. Precipitation, on the other hand, was least frequent during the summer months. Precipitation levels were highest during Fall and Spring, followed by Winter.
2. The table eugclim_alt is organized with months as the columns and variables as the rows, while eugclim has the variables as columns. It is possible to create a time-series plot similar to those produced using eugclim by using the following lines:

```
eugclim_alt_prcp <- gather(eugclim_alt[eugclim_alt$param=="prcp", ], `1`:`12`,
key="month", value="cases")
plot(eugclim_alt_prcp$month, eugclim_alt_prcp$cases, pch=16, xaxp=c(1,12,1))
```

3. The gather() function organized the data by year and month with each variable getting its own line for that month and year. The spread() function reshaped the table, putting the variables into columns so that each month and year only has one row.
4. The benefit to reshaping data in R instead of in Excel is that it can be automated and the process is easily reproduced.
5. Matrices A and B both have dimensions 3, 2, while matrix C has dimensions 3, 3 and is square.
6. The matrices A and C cannot be added because they do not share the same shape. A's dimensions are 3, 2 and C's dimensions are 3, 3.
7. Matrices A and C can be multiplied, but A and B cannot. When performing matrix multiplication, the first matrix's second dimension must match the second's first (A must have the same amount of columns as B has rows).

Noah Tigner

GEOG 495

Exercise 5 – Data Wrangling & Matrix Algebra

8. We can check if solve(R) actually produced the inverse of R by multiplying it by R. After rounding insignificantly small numbers, we are left with the identity matrix I3, or

```
     [,1] [,2] [,3]
[1,]    1    0    0
[2,]    0    1    0
[3,]    0    0    1.
```

We can therefore conclude that Rinv is the inverse of R.