

1A.

```
> colMeans(USArrests)
Murder  Assault  UrbanPop   Rape
  7.788   170.760   65.540   21.232
```

sei

```
> median(USArrests$Murder)
[1] 7.25
> median(USArrests$Assault)
[1] 159
> median(USArrests$UrbanPop)
[1] 66
> median(USArrests$Rape)
[1] 20.1
```

```
> var(USArrests$Murder)
[1] 18.97047
> var(USArrests$Assault)
[1] 6945.166
> var(USArrests$UrbanPop)
[1] 209.5188
> var(USArrests$Rape)
[1] 87.72916
```

```
> sd(USArrests$Murder)
[1] 4.35551
> sd(USArrests$Assault)
[1] 83.33766
> sd(USArrests$UrbanPop)
[1] 14.47476
> sd(USArrests$Rape)
[1] 9.366385
```

```
> IQR(USArrests$Murder)
[1] 7.175
> IQR(USArrests$Assault)
[1] 140
> IQR(USArrests$UrbanPop)
[1] 23.25
>
> IQR(USArrests$Rape
+
+ )
[1] 11.1
```

1B.

```
> library(psych)
> skew(USArrests$Murder)
[1] 0.3706342
```

```

> skew(USArrests$Assault)
[1] 0.2205325
> skew(USArrests$UrbanPop)
[1] -0.2126297
> skew(USArrests$Rape)
[1] 0.7537694

> kurtosi(USArrests$Murder)
[1] -0.9492304
> kurtosi(USArrests$Assault)
[1] -1.145487
> kurtosi(USArrests$UrbanPop)
[1] -0.871955
> kurtosi(USArrests$Rape)
[1] 0.07510264

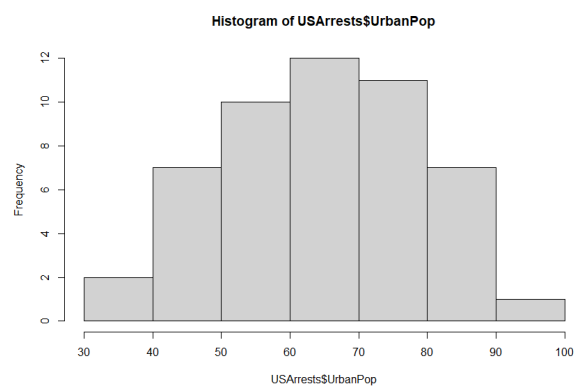
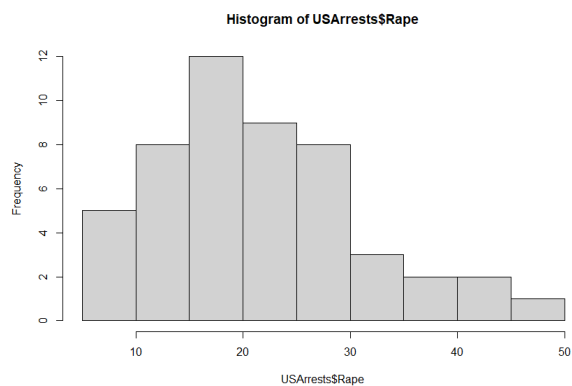
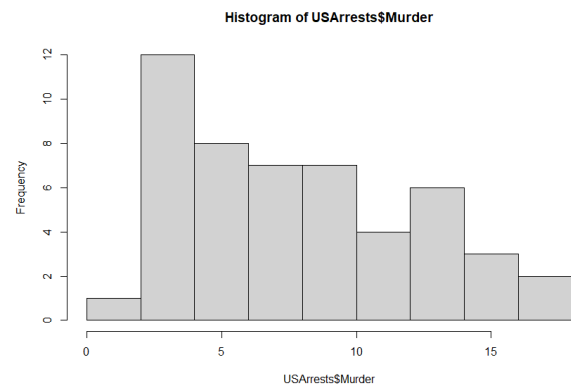
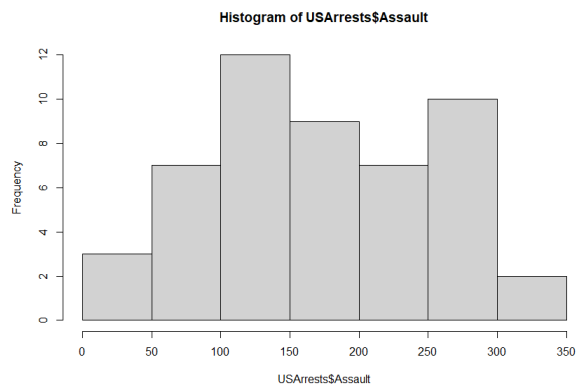
```

1C.

```

> hist(USArrests$Murder)
> hist(USArrests$Assault)
> hist(USArrests$UrbanPop)
> hist(USArrests$Rape)

```



1D.

```
> cor(x = USArrests,method = "spearman")
      Murder Assault UrbanPop Rape
Murder  1.0000000 0.8172735 0.1067163 0.6794265
Assault  0.8172735 1.0000000 0.2752133 0.7143681
UrbanPop 0.1067163 0.2752133 1.0000000 0.4381068
Rape     0.6794265 0.7143681 0.4381068 1.0000000

> cor(x = USArrests,method = "pearson")
      Murder Assault UrbanPop Rape
Murder  1.00000000 0.8018733 0.06957262 0.5635788
Assault  0.80187331 1.0000000 0.25887170 0.6652412
UrbanPop 0.06957262 0.2588717 1.00000000 0.4113412
Rape     0.56357883 0.6652412 0.41134124 1.0000000
```

2A.

```
> state.x77=as.data.frame(state.x77)
> class(state.x77)
[1] "data.frame"
```

2B. (wasn't sure which one so i did both)

```
> summary(state.x77)
```

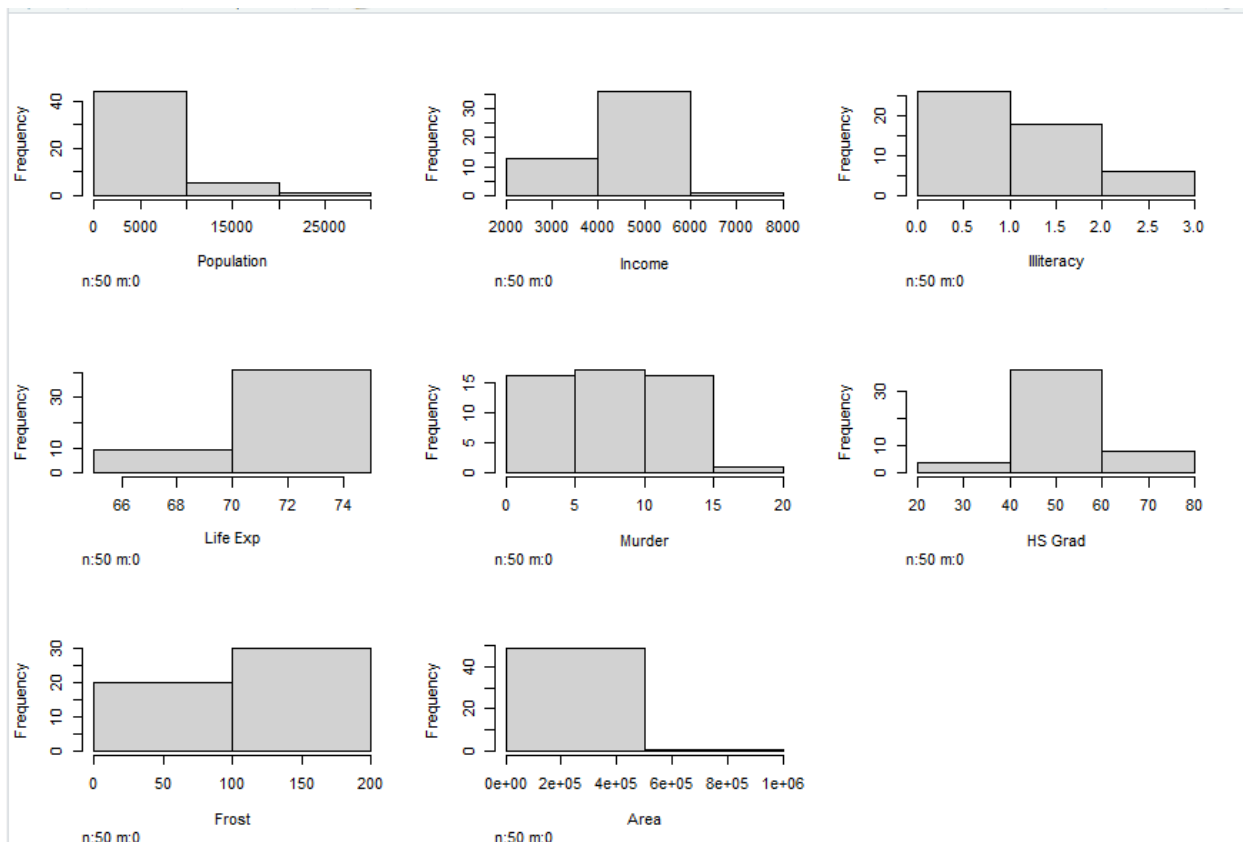
Population	Income	Illiteracy	Life Exp	Murder
HS Grad	Frost			
Min. : 365	Min. :3098	Min. :0.500	Min. :67.96	Min. : 1.400
Min. :37.80	Min. : 0.00			
1st Qu.: 1080	1st Qu.:3993	1st Qu.:0.625	1st Qu.:70.12	1st Qu.: 4.350
1st Qu.:48.05	1st Qu.: 66.25			
Median : 2838	Median :4519	Median :0.950	Median :70.67	Median : 6.850
Median :53.25	Median :114.50			
Mean : 4246	Mean :4436	Mean :1.170	Mean :70.88	Mean : 7.378
Mean :53.11	Mean :104.46			
3rd Qu.: 4968	3rd Qu.:4814	3rd Qu.:1.575	3rd Qu.:71.89	3rd Qu.:10.675
3rd Qu.:59.15	3rd Qu.:139.75			
Max. :21198	Max. :6315	Max. :2.800	Max. :73.60	Max. :15.100
Max. :67.30	Max. :188.00			
Area				
Min. : 1049				
1st Qu.: 36985				
Median : 54277				
Mean : 70736				
3rd Qu.: 81163				
Max. :566432				

```
> describe(state.x77)
```

	vars	n	mean	sd	median	trimmed	mad	min
max	range	skew	kurtosis	se				
Population	1	50	4246.42	4464.49	2838.50	3384.28	2890.33	365.00
21198.0	20833.00	1.92	3.75	631.37				
Income	2	50	4435.80	614.47	4519.00	4430.08	581.18	3098.00
6315.0	3217.00	0.20	0.24	86.90				
Illiteracy	3	50	1.17	0.61	0.95	1.10	0.52	0.50
2.8	2.30	0.82	-0.47	0.09				
Life Exp	4	50	70.88	1.34	70.67	70.92	1.54	67.96
73.6	5.64	-0.15	-0.67	0.19				
Murder	5	50	7.38	3.69	6.85	7.30	5.19	1.40
15.1	13.70	0.13	-1.21	0.52				
HS Grad	6	50	53.11	8.08	53.25	53.34	8.60	37.80
67.3	29.50	-0.32	-0.88	1.14				
Frost	7	50	104.46	51.98	114.50	106.80	53.37	0.00
188.0	188.00	-0.37	-0.94	7.35				
Area	8	50	70735.88	85327.30	54277.00	56575.72	35144.29	1049.00
566432.0	565383.00	4.10	20.39	12067.10				

2C.

```
install.packages("Hmisc")
```



```
> library(Hmisc)
```

```
> hist.data.frame(state.x77)
```

2D.

```
> cor(x = state.x77,method = "pearson")
```

	Population	Income	Illiteracy	Life Exp	Murder	HS
Grad	Frost	Area				
Population	1.00000000	0.2082276	0.10762237	-0.06805195	0.3436428	
-0.09848975	-0.3321525	0.02254384				
Income	0.20822756	1.0000000	-0.43707519	0.34025534	-0.2300776	
0.61993232	0.2262822	0.36331544				
Illiteracy	0.10762237	-0.4370752	1.00000000	-0.58847793	0.7029752	
-0.65718861	-0.6719470	0.07726113				
Life Exp	-0.06805195	0.3402553	-0.58847793	1.00000000	-0.7808458	
0.58221620	0.2620680	-0.10733194				
Murder	0.34364275	-0.2300776	0.70297520	-0.78084575	1.0000000	
-0.48797102	-0.5388834	0.22839021				
HS Grad	-0.09848975	0.6199323	-0.65718861	0.58221620	-0.4879710	
1.00000000	0.3667797	0.33354187				
Frost	-0.33215245	0.2262822	-0.67194697	0.26206801	-0.5388834	
0.36677970	1.0000000	0.05922910				
Area	0.02254384	0.3633154	0.07726113	-0.10733194	0.2283902	
0.33354187	0.0592291	1.00000000				

```
> cor(x = state.x77,method = "spearman")
```

	Population	Income	Illiteracy	Life Exp	Murder	HS Grad
Frost	Area					
Population	1.0000000	0.12460984	0.3130496	-0.1040171	0.3457401	-0.3833649
-0.4588526	-0.12067227					
Income	0.1246098	1.00000000	-0.3145948	0.3241050	-0.2174623	0.5104809
0.1968638	0.05709484					
Illiteracy	0.3130496	-0.31459482	1.0000000	-0.5553735	0.6723592	-0.6545396
-0.6831936	-0.25037208					
Life Exp	-0.1040171	0.32410498	-0.5553735	1.0000000	-0.7802406	0.5239410
0.2983910	0.12750018					
Murder	0.3457401	-0.21746230	0.6723592	-0.7802406	1.0000000	-0.4367330
-0.5438432	0.10642590					
HS Grad	-0.3833649	0.51048095	-0.6545396	0.5239410	-0.4367330	1.0000000
0.3985351	0.43897520					
Frost	-0.4588526	0.19686382	-0.6831936	0.2983910	-0.5438432	0.3985351
1.0000000	0.11228778					
Area						

The hs_grad to murder relationship is interesting, although i cannot explain why it is like that.

2E.

```
> row.names(state.x77)[which.max(state.x77$Population)]
```

```
[1] "California"
```

```
> row.names(state.x77) [which.min(state.x77$Population)]
[1] "Alaska"
> row.names(state.x77) [which.max(state.x77$Income)]
[1] "Alaska"
> row.names(state.x77) [which.min(state.x77$Income)]
[1] "Mississippi"
> row.names(state.x77) [which.max(state.x77$Illiteracy)]
[1] "Louisiana"
> row.names(state.x77) [which.min(state.x77$Illiteracy)]
[1] "Iowa"
> row.names(state.x77) [which.max(state.x77$`Life Exp`)]
[1] "Hawaii"
> row.names(state.x77) [which.min(state.x77$`Life Exp`)]
[1] "South Carolina"
> row.names(state.x77) [which.max(state.x77$Murder)]
[1] "Alabama"
> row.names(state.x77) [which.min(state.x77$Murder)]
[1] "North Dakota"
> row.names(state.x77) [which.max(state.x77$`HS Grad`)]
[1] "Utah"
> row.names(state.x77) [which.min(state.x77$`HS Grad`)]
[1] "South Carolina"
> row.names(state.x77) [which.max(state.x77$Frost)]
[1] "Nevada"
> row.names(state.x77) [which.min(state.x77$Frost)]
[1] "Hawaii"
> row.names(state.x77) [which.max(state.x77$Area)]
[1] "Alaska"
> row.names(state.x77) [which.min(state.x77$Area)]
[1] "Rhode Island"
```