Day5 - Nathan Yee

Initalization

In[356]:=
```
SetDirectory[NotebookDirectory[]]
```

Out[356]=
```
/home/nathan/QEA-Homework/module2/day5
```

Data

In[28]:=
```
barData = Import["bar.csv"];
svp = Import["svp.csv"];
stateData = Import["stateData.csv"];
```

Functions

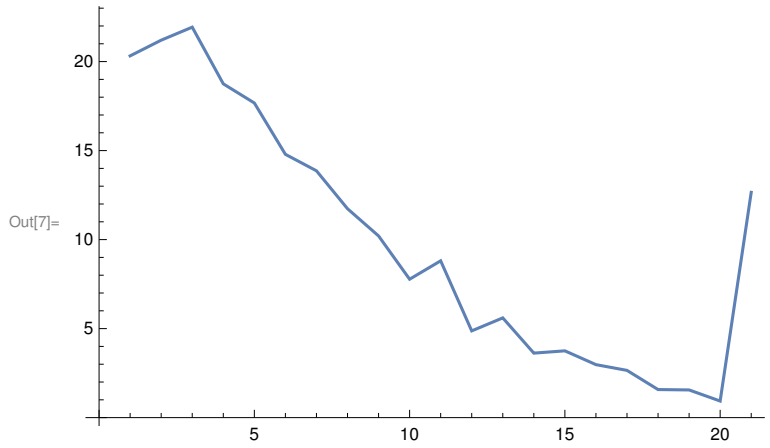
In[5]:=
```
Basic[data_] :=
 {{"Mean", N@Mean[data]}, {"Median", Median[data]}, {"Variance", N@Variance[data]},
  {"Standard Deviation", N@StandardDeviation[data]}}
```

In[111]:=
```
MyCorrelation[data1_, data2_] :=
 (Total[(data1 - Mean[data1]) * (data2 - Mean[data2])] / (Length[data1] *
     Length[data2] * StandardDeviation[data1] * StandardDeviation[data2]))
```

Question 1

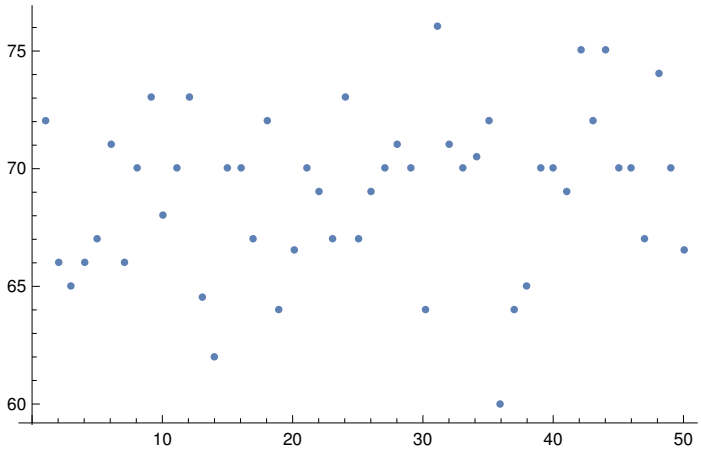
In[7]:=
```
ListLinePlot[barData[[All, 2]]]
```

Out[7]=



Question 2

```
ListPlot[svp]
```



Question 3

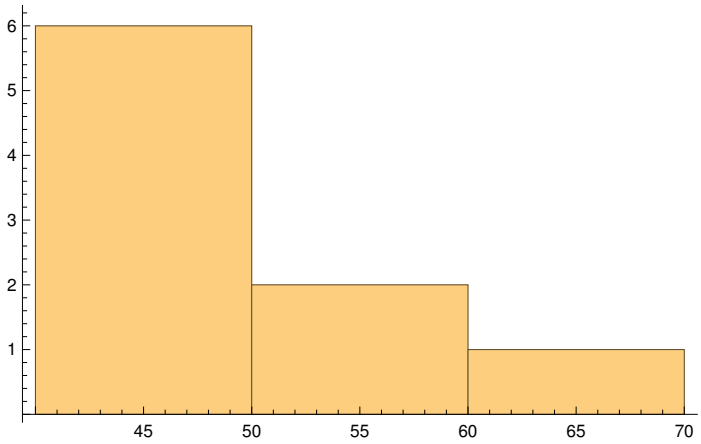
- Mean = 2
- Standard Deviation = 1

Question 4

```
dataQuestion4 = {57, 61, 46, 43, 46, 46, 46, 46, 55}
```

```
{57, 61, 46, 43, 46, 46, 46, 46, 55}
```

```
Histogram[dataQuestion4]
```




```
Grid[Basic[dataQuestion4], Frame → All]
```

Mean	49.5556
Median	46
Variance	40.2778
Standard Deviation	6.34648

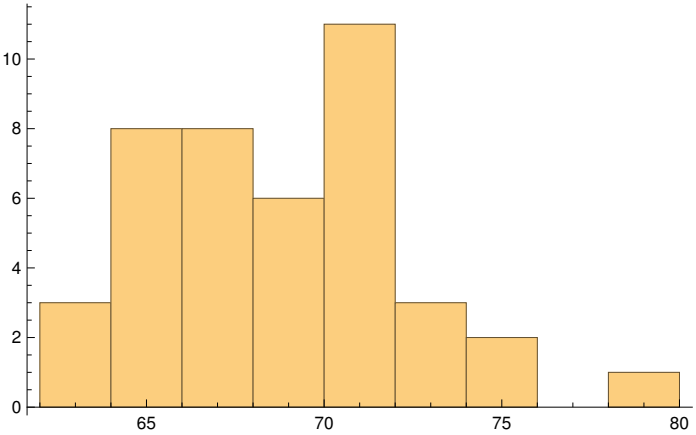
- Standard deviations can vary wildly with a small sample size

Question 5

```
dataQuestion5 =
  {63, 66, 71, 65, 70, 66, 67, 65, 67, 74, 64, 75, 68, 67, 70, 73, 66, 70, 72, 62, 68,
   70, 62, 69, 66, 70, 70, 68, 69, 70, 71, 65, 64, 71, 64, 78, 69, 70, 65, 66, 72, 64};
```

In[16]:=
```
Histogram[dataQuestion5, 10]
```

Out[16]=




```
Grid[Basic[dataQuestion5], Frame → All]
```

Mean	68.1429
Median	68
Variance	12.7596
Standard Deviation	3.57206

- The mean looks like it should be less than 70 and greater than 65.
- The Standard Deviation looks like it should be in the range of 3 - 5

Question 6

- Correlated: Doctors, University
- Anticorrelated: Income, Poverty
- Uncorrelated: Unemployed, Infant Mort

Question 7

In[128]:=
```
Grid[Transpose@{{"Correlated: Doctors, University",
    "Anticorrelated: Income, Poverty", "Uncorrelated: Unemployed, Infant Mort"},
   {N@MyCorrelation[stateData[[2 ;; All, 6]], stateData[[2 ;; All, 8]]],
    N@MyCorrelation[stateData[[2 ;; All, 10]], stateData[[2 ;; All, 2]]],
    N@MyCorrelation[stateData[[2 ;; All, 9]], stateData[[2 ;; All, 3]]]}},
 Frame → All]
```

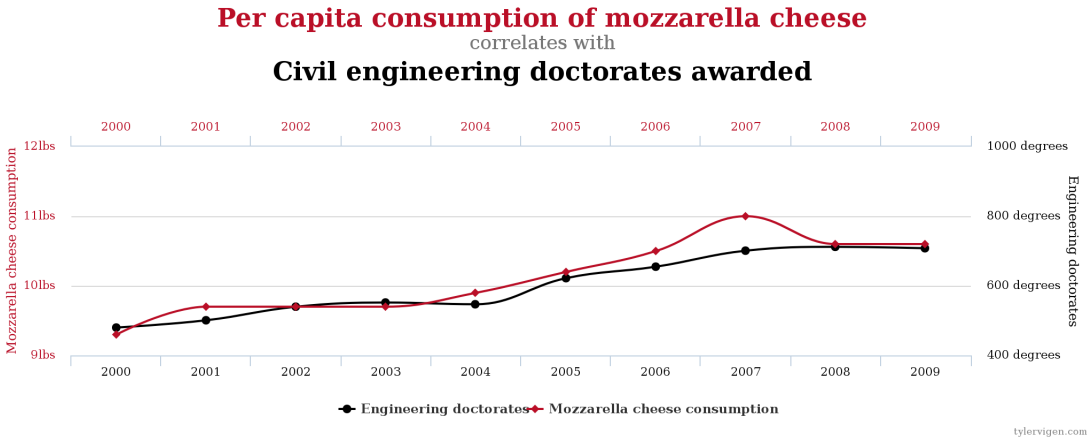
Out[128]=

Correlated: Doctors, University	0.0565386
Anticorrelated: Income, Poverty	-0.0687899
Uncorrelated: Unemployed, Infant Mort	-0.0120852

Question 8

- A. Plug them into mu function
- B. I don't understand question. I'll ask when I get the chance during checkoff or in class.

Question 9



Question 10

In[135]:=
```
a = (24 - 22) / (300 - 60);
```

In[139]:=
```
N@Solve[22 == (a * 60) + b, b][[1]][[1]]
```

Out[139]=
```
b → 21.5
```

Question 11

- Same as question 10

Question 12

In[308]:=
```
Clear[a, b]
```

In[168]:=
```
A = {{60, 1}, {300, 1}};
x = {{a}, {b}};
B = {{22}, {24}};
```

In[171]:=
```
Solve[A.x == B, {a, b}]
```

Out[171]=
$$\left\{\left\{a \to \frac{1}{120},\ b \to \frac{43}{2}\right\}\right\}$$

In[183]:=
```
Inverse[A].B
```

Out[183]=
$$\left\{\left\{\frac{1}{120}\right\},\ \left\{\frac{43}{2}\right\}\right\}$$

Question 13

In[299]:=
```
t = {53, 54, 58, 66, 69, 70, 71, 73, 81};
c = {19, 26, 21, 33, 31, 36, 36, 38, 45};
```

In[301]:=
```
x = Total[c];
y = Total[t];
x2 = Total[c^2];
xy = Total[c * t];
n = Length[c]
```

Out[305]= 9

Question 14

In[309]:=
```
Clear[a, b]
```

In[310]:=
```
solutions = N@Solve[a * x2 + b * x == xy && n * b + a * x == y, {a, b}]
```

Out[310]= {{a → 1.06265, b → 32.4606}}

In[311]:=
```
{a, b} = {a, b} /. solutions[[1]]
```

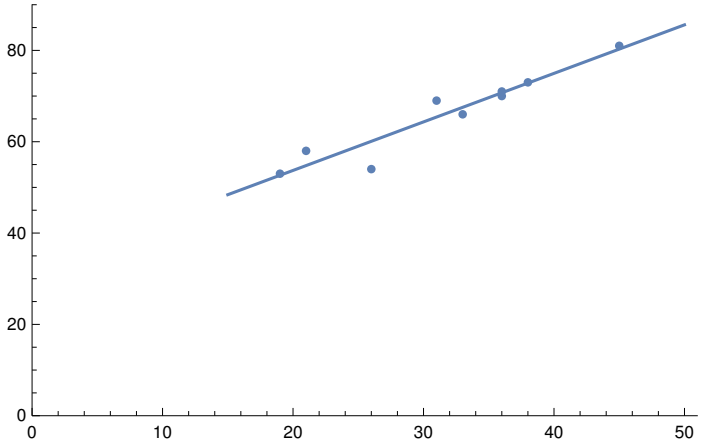
Out[311]= {1.06265, 32.4606}

In[312]:=
```
CricketTemp[x_] := a * x + b
```

In[313]:=
```
p1 = Plot[CricketTemp[i], {i, 15, 50}, PlotRange → {{0, Automatic}, {0, Automatic}}];
p2 = ListPlot[Transpose[Join[{c}, {t}]]];
```

In[315]:=
```
Show[p1, p2]
```

Out[315]=



Question 15

In[337]:=
```
Clear[a, b]
```

In[346]:=
```
"(x  n)·(a)=(y)";
 x2 x   b   xy
A = (x  n);
    x2 x
u = (a);
    b
B = (y);
    xy
```

In[351]:=
```
N@Inverse[A].B
```

Out[351]=
```
{{1.06265}, {32.4606}}
```