```
General::spell1 :
 Possible spelling error: new symbol name "median" is similar to existing symbol "Median". More…
```

TO START THIS MATHEMATICA NOTEBOOK YOU CLICK ITS FILENAME.
You will have to use a computer in a university lab (e.g. Wells Hall B-Wing)
I will announce when the program is ready for you to use.

To save your work select save from the pull down file menu, which saves it as a *Mathematica* .nb (notebook) file. If you wish to print your work at home select print then the option of saving as a PDF. You will be unable to work with the .nb *Mathematica* file itself unless you have *Mathematica* installed (unlikely) but you can transport and print the .pdf file virtually anywhere.

This *Mathematica* notebook contains a number of useful functions described in the handout and briefly indicated below. The first time you attempt to use one of these functions a panel will pop up asking "Do you want to evaluate all the initialization cells?" to which you must answer yes.

To enter a given command line you click on the screen whereupon a horizontal line should appear at the cursor. When right brackets are in view on the *Mathematica* panel you want to click at a place where a horizontal line will extend between two such brackets if you desire a new line. If you attempt to type multiple commands into a single bracketed location *Mathematica* will become confused.

Type the command you wish to execute then PRESS THE ENTER KEY ON THE NUMERIC KEYPAD. This is required because *Mathematica* wants to use the return or other enter key to move to the next line. You do nor want to move to a new line. You want to enter a command. That is why you must use the ENTER key on the numeric keypad. I will illustrate this. Click the line below and press ENTER on the numeric keypad.

```
In[249]:=
        size[{4.5, 7.1, 7.8, 9.1}]

Out[249]=
        4
```

Just above, I clicked to open a new line then typed

size[{4.5, 7.1, 7.8, 9.1}]

followed by a press of the numeric keypad ENTER key. Notice that off to the right of the entry there are nested brackets joining the command line and its output 4 = the number of data items in {4.5, 7.1, 7.8, 9.1}.

■ A complete list of the commands in this notebook and what they do.

size[{4.5, 7.1, 7.8, 9.1}] returns 4
mean[{4.5, 7.1, 7.8, 9.1}] returns the mean 7.125
median[{4.5, 7.1, 7.8, 9.1}] returns the median of the list {4.5, 7.1, 7.8, 9.1}
sd[{4.5, 7.1, 7.8, 9.1}] returns the sample standard deviation s=1.93628
sample[{4.5, 7.1, 7.8, 9.1}, 10] returns 10 samples from {4.5, 7.1, 7.8, 9.1}
ci[{4.5, 7.1, 7.8, 9.1}, 1.96] returns a 1.96 coefficient CI for the given data
bootci[mean, {4.5, 7.1, 7.8, 9.1}, 10000, 0.95] returns 0.95 bootstrap ci for pop mean
smooth[{4.5, 7.1, 7.8, 9.1}, 0.2] returns the density for data at bandwidth 0.2
smooth2[{4.5, 7.1, 7.8, 9.1}, 0.2] returns the density for data at bandwidth 0.2*
* overlaid with normal densities having sd = 0.2 around each data value
popSALES is a file of 4000 sales amounts used for examples*
* entering **popSALES** will spill 4000 numbers onto the screen. To prevent that enter **popSALES;** instead (the appended semi-colon suppresses output).

```
Mean[popSALES]
```

```
14.9758
```

The next line finds a sample of 40 from popSALES. The line below that finds a 95% z-CI for the population mean. It outputs {mean, n, s, z (or t), CI}.

In *Mathematica* the percent character % refers to the output of the very last command execution.

In[250]:=

```
mysample = sample[popSALES, 40]
```

Out[250]=

```
{8.21, 19.13, 9.37, 10.21, 26.81, 10.16, 30.67, 24.73, 28.35, 9.42, 5.79, 12.29, 3.39, 6.51,
 30.04, 17.67, 11.81, 2.3, 1.7, 11.52, 7.18, 26.79, 12.11, 17.92, 26.16, 10.3, 26.76,
 19.6, 11.05, 3.51, 14.36, 23.59, 36.29, 16.53, 7.84, 38.25, 15.35, 6.73, 7.58, 12.37}
```

In[251]:=

```
ci[mysample, 1.96]
```

Out[251]=

```
{15.5088, 40., 9.65513, 1.96, {12.5166, 18.5009}}
```

In[252]:=

```
bootci[mean, mysample, 10000, 0.95]
```

Out[252]//MatrixForm=

Confidence Level	0.95
Estimator	mean
Estimate	15.5088
Sample Size	40
bs Replications #1	10000
bootstrap C ci Half Width	2.94425
CI	{12.5645, 18.453}

In[254]:=
```
median[popSALES]
```

Out[254]=
```
12.66
```

In[255]:=
```
median[mysample]
```

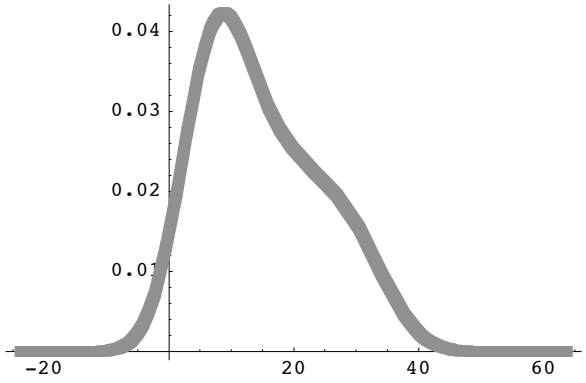
Out[255]=
```
12.2
```

In[256]:=
```
bootci[median, mysample, 10000, 0.95]
```

Out[256]//MatrixForm=

Confidence Level	0.95
Estimator	median
Estimate	12.2
Sample Size	40
bs Replications #1	10000
bootstrap C ci Half Width	4.9
CI	{7.3, 17.1}

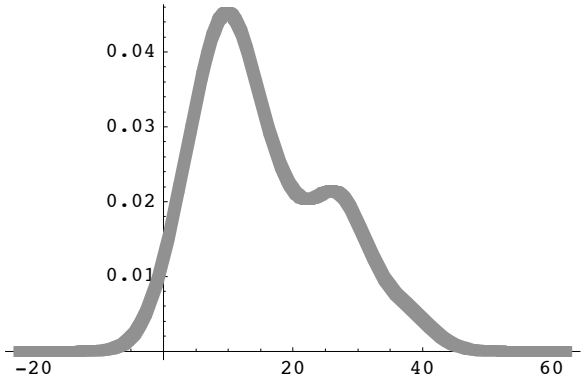
In[263]:=
```
smooth[popSALES, 4]
```



Out[263]=
```
- Graphics -
```

In[264]:=

```
smooth[mysample, 4]
```

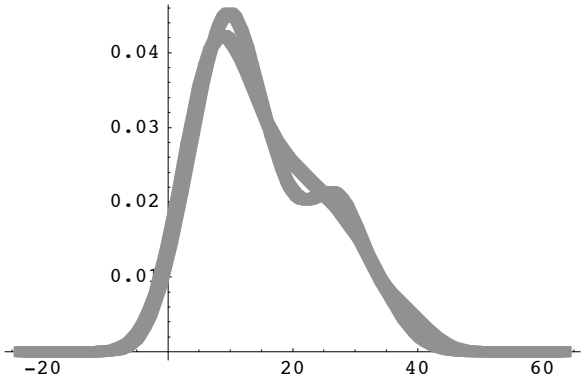


Out[264]=

```
- Graphics -
```

In[265]:=

```
Show[%, %%]
```



Out[265]=

```
- Graphics -
```