M E 345

Today, we will:

- Do a couple review example problems basic statistics
- Review the pdf module: **Histograms** and do some examples
- Review the pdf module: **Probability Density Functions** (**PDFs**) and do some examples

Example: Basic statistics

Given: The true (exact) speed in a wind tunnel is 44.63 m/s. Ten velocity readings are taken. The sample mean is 44.580 m/s:

Original data	Data in increasing order
44.54	44.53
44.62	44.54
44.57	44.56
44.56	44.57
44.61	44.57
44.53	44.58
44.57	44.59
44.59	44.61
44.63	44.62
44.58	44.63

To do: Calculate the following, giving your answers to the appropriate number of significant digits:

(a) The systematic (or bias) error of the instrument, based on these readings.

- (b) The sample median
- (c) The sample mode

Solution:

[See also Excel spreadsheet on the website for this same problem]

Example: Basic statistics

Given: Ten houses are sold in the State College area during a particular time period. The selling prices are listed (in increasing order), rounded to the nearest 500 dollars.

1	\$242,000
2	\$253,000
3	\$264,000
4	\$267,500
5	\$269,000
6	\$278,000
7	\$286,500
8	\$299,000
9	\$327,000
10	\$748,000

To do: Calculate the mean, mode, and median, and discuss.

Solution:

Example: Histograms

Given: The histogram shown here (not normalized), produced in Excel from 50 voltage measurements.

To do:

(*a*) How many data points have a voltage less than or equal to 6 V?

(*b*) How many data points have a voltage that lies between 6 V and 8 V?

(c) How many data points have a voltage that lies between 3 V and 10 V?

(*d*) What is the *probability* (in percent) that a given reading lies between 5 V and 6 V?

(*e*) When we transform the vertical axis from frequency (number of data points) to f(x) (vertically normalized histogram), what is the value of f(x) for the bin between 5 and 6 on the horizontal axis?

(*f*) The sample mean is 6.76 and the sample standard deviation is 1.31. When we transform the vertically normalized histogram f(x) into a PDF, and then into a normalized PDF, what is the value of f(z) for x = 8.5?

Solution:

