Three important characteristics of distributions
  
  Shape
  Central Tendency
  Variability (or variation)

Review #1: List three measures of variation:

____________________  ___________________  ___________________
Review #1: List the three measures of variation. Answer: 

Yours: ___________ ___________ ___________
Mine: ___________ ___________ ___________

Review #2: Define the range: ___________

Review #3: Define the variance: ___________
Lectlet 5B Page 3

<table>
<thead>
<tr>
<th>Answers:</th>
<th>Yours</th>
<th>Mine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review #2: Define the range:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review #3: Define the variance:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Deviation: \[ \text{deviation} = X - \mu \]

Squared deviation: \[ \text{deviation}^2 = (X - \mu)^2 \]

Variance: \[ \sigma^2 = \frac{\sum (X - \mu)^2}{N} \]

Review #4: Define the standard deviation.
Lectlet 5B Page 4

Review #4: Define the standard deviation. **Answer:**

\[
\text{Variance} = \text{mean of the squared deviations } = \frac{\sum (X - \mu)^2}{N}
\]

**Standard deviation** =

\[
\sigma = \sqrt{\frac{\sum (X - \mu)^2}{N}}
\]

New material begins...

**Population and Sample Formulas for the Standard Deviation**

**Mean squared deviation formula**

Population  \( \sigma = \sqrt{\frac{\sum (X - \mu)^2}{N}} \)

Sample  \( s = \sqrt{\frac{\sum (X - \bar{X})^2}{n-1}} \)
Eyeball-Estimating the standard deviation

<table>
<thead>
<tr>
<th>ESTAT routine</th>
<th>Start with...</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>sdest</td>
<td>histogram</td>
<td>inflection point method</td>
</tr>
<tr>
<td>sdnum</td>
<td>table</td>
<td>range method</td>
</tr>
</tbody>
</table>

For both sdest and sdnum:
1. Take tutorial
2. Eyeball-estimate 8 to 10 distributions (eyeball-errors should be about 10%)
3. Ask "What if...?" and use Edit to find out

Use ESTAT's DataGen:
- It computes $s$ and $s^2$ automatically
- If you need $\sigma$, multiply $s$ by $\sqrt{\frac{n-1}{N}}$

End of lectlet.