1) On the first 11 days in May, Bloomington Hospital records the number of births on each day. These numbers are listed below:

0, 0, 3, 10, 4, 2, 12, 4, 1, 0, 5

a) Are the number of births a continuous or discrete variable? (1 point)

\text{discrete}

b) Are the number of births considered nominal, ordinal, interval or ratio data? (1 point)

\text{ratio}

c) Display these points on a frequency distribution graph. Label the x and y axes. (2 points)

![Frequency Distribution Graph]

\# of births

\begin{align*}
d) \text{What shape is this distribution (positively skewed, negatively skewed, or symmetric)? (1 point)} \\
& \text{positively skewed}
\end{align*}

e) Find the mean, the median and the mode. (2 points)

\begin{align*}
\mu &= \frac{\sum x}{n} = \frac{44}{11} = 3.73 \\
M &= \frac{\sum x}{n} = \frac{44}{11} = 3.73 \\
\text{Median} &= 3 \\
\text{Mode} &= 0
\end{align*}

f) In your judgment, which is the best measurement of the central tendency of this distribution, and why is it the best? (1 point)

\text{Median - best for positively skewed data}
2. New mean $\mu = 8$
   New inter-quartile range $= 6$
   New variance $\sigma^2 = 5$

3. A. Finish = ORDINAL
   Car Number = NOMINAL
   Laps = RATIO

        | SCORE | FREQU. | fX table | $x^2$ table | $f x^2$ table |
        |-------|--------|----------|-------------|---------------|
        | 52    | 1      | 52       | 2704        | 2704          |
        | 40    | 1      | 40       | 1600        | 1600          |
        | 29    | 1      | 29       | 841         | 841           |
        | 27    | 1      | 27       | 729         | 729           |
        | 22    | 1      | 22       | 484         | 484           |
        | 16    | 1      | 16       | 256         | 256           |
        | 13    | 1      | 13       | 169         | 169           |
        | 0     | 25     | 0        | 0           | 0             |

   $\bar{x} = \frac{\sum fx}{N} = \frac{200}{33} \approx 6.06$
   $\text{median} = 0$
   $\text{mode} = 0$

   (17th score)

D. See table above.

E. $SS = \sum x^2 - \left(\frac{\sum x}{N}\right)^2 = 6784 - (200)^2 = 6784 - 40000 = -33216$

   $\sigma^2 = \frac{SS}{N} = \frac{-33216}{33} = -1007.18$

   $\sigma = \sqrt{\frac{SS}{N}} = \sqrt{1007.18} \approx 31.75$

F. RUNNING

G. Positively skewed
4) Here is the table similar to that from page 129 in your text:

<table>
<thead>
<tr>
<th>Sample Number</th>
<th>1st score</th>
<th>2nd score</th>
<th>Sample Mean</th>
<th>Sample Variance</th>
<th>Sample Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>6</td>
<td>3.00</td>
<td>18.00</td>
<td>4.24</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>9</td>
<td>4.50</td>
<td>40.50</td>
<td>6.36</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>0</td>
<td>3.00</td>
<td>18.00</td>
<td>4.24</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>6</td>
<td>6.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>9</td>
<td>7.50</td>
<td>40.50</td>
<td>6.36</td>
</tr>
<tr>
<td>7</td>
<td>9</td>
<td>0</td>
<td>4.50</td>
<td>40.50</td>
<td>6.36</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>6</td>
<td>7.50</td>
<td>40.50</td>
<td>6.36</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

This was taken from the population of scores 0, 0, 6, 6, 9, 9

a) Compute the mean, variance and standard deviation of this population. Show your work by first computing SS for the population. (3 points)

\[ \mu = \frac{\sum x}{n} = \frac{30}{6} = 5 \]

\[ \sigma^2 = \frac{SS}{n} = \frac{84}{6} = 14 \]

\[ \sigma = \sqrt{\sigma^2} = \sqrt{14} = 3.74 \]

\[ \sum x = 30 \quad n = 6 \]

\[ SS = \sum x^2 - \frac{(\sum x)^2}{n} = \sum x^2 - \frac{(30)^2}{6} \]

\[ = 234 - \frac{900}{6} = 234 - 150 = 84 \]

\[ \sigma^2 = \frac{\sum (x - \mu)^2}{n} = \frac{234}{6} = 39 \]

\[ \sigma = \sqrt{\sigma^2} = \sqrt{39} = 6.23 \]

b) Compute the average of the sample means, the average of the sample variances, and the average of the sample standard deviations. (3 points)

\[ \bar{X} = \frac{\sum X}{n} = \frac{45}{9} = 5 \]

\[ s^2 = \frac{\sum X^2}{n} - \frac{(\sum X)^2}{n^2} = \frac{126}{9} = 14 \]

\[ s = \sqrt{s^2} = \sqrt{14} = 3.74 \]

b) Which of these is equal to the corresponding population values? (1 point)

\[ \bar{X} = \mu \quad \text{and} \quad \sigma^2 = \sigma^2 \]
5) For the following set of scores. (2 points)

3, 2, 5, 3, 3

a) Find \( \sum (X - \bar{X})^2 \).

\[
\sum (x - \bar{x})^2 - 2 = 0 - 2 = -2
\]

b) Find \( \sum (2X + 1) \)

<table>
<thead>
<tr>
<th>X</th>
<th>2X</th>
<th>2X+1</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

\[\sum = 37\]

6) Suppose clinical trials are run on 10 dyslexic subjects. Five subjects get a drug therapy and 5 receive a placebo (sugar pill). After several weeks, the two groups are given a reading test and the number of words they read in 5 minutes is recorded. (5 points)

a) What is the population of interest?

\(\text{dyslexics}\)

b) What is the independent variable?

gas pill vs drug therapy \(\text{(type of treatment)}\)

c) Is the independent variable discrete or continuous?

\(\text{discrete}\)

d) What is the dependent variable?

\(\text{number of words read in 5 minutes}\)

e) What scale is the dependent variable measured on (nominal, ordinal, interval, ratio)?

\(\text{ratio}\)