Your calculator should give you $x$, $y$, $r$, $s_x$, and $s_y$. It may also give you $a$, $b$, and $SS_x$. If not, use their formulas.

Page 524. Don't use rounded answers in calculations, save to memory.

12.6 (9). You are given $n=5$ pairs of values for $x$ and $y$.

<table>
<thead>
<tr>
<th>$x$</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y$</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

$x = 0$  
$s_x = 1.5811$  
$ar{y} = 3$  
$s_y = 2$  
$n = 5$  
$r = .94868$  
$b = 1.2$  
$a = 3$

Regression line: $y = a + bx$:  
$y = 3 + 1.2x$

$SS_x = (n-1)(s_x)^2 = 10$

$MSE = (1 - r^2)(n-1)(s_y)^2/(n-2) = .5333$

- Estimate the std. dev. of the residual error $\varepsilon$: $s = \ldots$
- Find the percentage of variation in $y$ which is determined by the least-squares line. $r^2 = \ldots \%$
- Find the confidence interval for the average value of $y$ if $x = 1$.
  
  $df = \ldots$  
  $t_{\alpha/2} = \ldots$

  $SE = \ldots$

  $(a+bx) \pm t_{\alpha/2}SE = (\ldots \pm \ldots)(\ldots)$

  $=[\ldots, \ldots]$  

- Find the confidence interval for the measurement $y$ if $x = 1$.

  $SE = \ldots$

  $(a+bx) \pm t_{\alpha/2}SE = (\ldots \pm \ldots)(\ldots)$

  $=[\ldots, \ldots]$  

12.10 (9). A study was conducted to determine the effects of sleep deprivation on problem solving ability. Ten subjects participated in the study. Five levels of sleep deprivation were tested: 8, 12, 16, 20, and 24 hours without sleep. Two subjects were assigned to each level of sleep deprivation. After the sleep deprivation period each subject was given a set of addition problems and the number of errors recorded.

<table>
<thead>
<tr>
<th># Errors</th>
<th>8, 6</th>
<th>6, 10</th>
<th>8, 14</th>
<th>14, 12</th>
<th>16, 12</th>
</tr>
</thead>
<tbody>
<tr>
<td># Hours</td>
<td>8</td>
<td>12</td>
<td>16</td>
<td>20</td>
<td>24</td>
</tr>
</tbody>
</table>

Clearly the hours $x$ is the independent variable and the number of errors $y$ is the dependent variable. The $n=10$ pairs of observations:  
{(8,8),(8,6),(12,6),(12,10),(16,8),(16,14),(20,14),(20,12),(24,16),(24,12)}.

$x = 16$  
$s_x = 5.9628$  
$ar{y} = 10.6$  
$s_y = 3.5340$  
$n = 10$  
$r = .8015$  
$b = .475$  
$a = 3$

Regression line: $y = a + bx$:  
$y = 3 + .475x$

$SS_x = (n-1)(s_x)^2 = 320$

$MSE = (1 - r^2)(n-1)(s_y)^2/(n-2) = 5.025$

- Estimate the std. dev. of the residual error $\varepsilon$: $s = \ldots$
- Find the percentage of variation in $y$ which is determined by the least-squares line.
  
  $r^2 = \ldots \%$
- Find the confidence interval for the average value of $y$ if $x = 10$.
  
  $df = \ldots$  
  $t_{\alpha/2} = \ldots$

  $SE = \ldots$

  $(a+bx) \pm t_{\alpha/2}SE = (\ldots \pm \ldots)(\ldots)$

  $=[\ldots, \ldots]$  

- Find the confidence interval for the measurement $y$ if $x = 10$.

  $SE = \ldots$

  $(a+bx) \pm t_{\alpha/2}SE = (\ldots \pm \ldots)(\ldots)$

  $=[\ldots, \ldots]$  

- Find the confidence interval for the slope estimate $b$.

  $SE = \ldots$

  $b \pm t_{\alpha/2}SE = (\ldots \pm \ldots)(\ldots)$

  $=[\ldots, \ldots]$  

Math 373  Hw 30  Name _________________________________  Score ______/ 18