

## Regression III

(aka "Line of best fit", aka "Pearson correlation coefficient", aka "r")

<p>Here is a data table showing how much of a chemical has been produced at different points in time.</p> <p><b>[STAT] [1]</b></p>	<table border="1"> <thead> <tr> <th>Time (s)</th> <th>Mass (g)</th> </tr> </thead> <tbody> <tr><td>5</td><td>4</td></tr> <tr><td>7</td><td>12</td></tr> <tr><td>12</td><td>18</td></tr> <tr><td>18</td><td>22</td></tr> <tr><td>21</td><td>24</td></tr> <tr><td>24</td><td>29</td></tr> </tbody> </table>	Time (s)	Mass (g)	5	4	7	12	12	18	18	22	21	24	24	29																			
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<p>Have a look at the data.... You will need to turn on the "STAT PLOT", select the scatter graph (L1) and appropriate lists, then use the "ZoomStat" feature to set the window.</p>	<p><b>[2nd] [STAT PLOT] [1] [2nd] [QUIT]</b></p> <p><b>[GRAPH]</b></p> <p><b>[ZOOM] [9]</b></p>																																	
<p>Now get it to perform the calculation But this time we are going to place the line of best fit into one of the calculators Y functions.</p>	<p><b>[STAT] [▶] [4]</b></p> <p>You enter Y<sub>1</sub> by:</p> <p><b>[VARS] [▶] [1] [1] [ENTER]</b></p>																																	
<p>Look at the results It looks just the same, but the line of best fit is stored in Y<sub>1</sub> and if we graph we can see both the line and the data.</p>	<p><b>[LinReg]</b></p> <p>y=ax+b a=1.127731092 b=1.814565826 r<sup>2</sup>=.9345914735 r=.9667427132</p> <p><b>[2nd] [Plot2]</b></p> <p>Y1=1.1277310924 37X+1.8145658263 3 V2= V3= V4= V5=</p>																																	
<p>What is y when x=...? Use the table..... and adjust using TBLSET if necessary.</p> <p>What mass would we expect when t=9? Mass = 12.0g (3sf)</p> <p>What mass would we expect when t=15.4? Mass = 19.2g (3sf)</p>	<p><b>[2nd] [GRAPH]</b></p> <p><b>[2nd] [TBLSET]</b></p> <table border="1"> <thead> <tr><th>X</th><th>Y1</th></tr> </thead> <tbody> <tr><td>5</td><td>7.4532</td></tr> <tr><td>7</td><td>8.581</td></tr> <tr><td>12</td><td>8.7087</td></tr> <tr><td>18</td><td>10.836</td></tr> <tr><td>21</td><td>11.964</td></tr> <tr><td>24</td><td>12.092</td></tr> <tr><td>11</td><td>14.22</td></tr> </tbody> </table> <p>X=9</p> <table border="1"> <thead> <tr><th>X</th><th>Y1</th></tr> </thead> <tbody> <tr><td>15</td><td>18.734</td></tr> <tr><td>15.4</td><td>18.843</td></tr> <tr><td>15.2</td><td>18.956</td></tr> <tr><td>15.3</td><td>19.069</td></tr> <tr><td>15.4</td><td>19.182</td></tr> <tr><td>15.5</td><td>19.294</td></tr> <tr><td>15.6</td><td>19.407</td></tr> </tbody> </table> <p>X=15.4</p> <p>TABLE SETUP TblStart=15 ΔTbl=.1 Indpnt: AUTO Ask Depend: AUTO Ask</p>	X	Y1	5	7.4532	7	8.581	12	8.7087	18	10.836	21	11.964	24	12.092	11	14.22	X	Y1	15	18.734	15.4	18.843	15.2	18.956	15.3	19.069	15.4	19.182	15.5	19.294	15.6	19.407	
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<p>What is x when y=...? Plot a horizontal line and find the intersection.</p> <p>At what time would we have 23g of chemical? t= 18.8s (3sf)</p>	<p><b>[Y=]</b></p> <p>Enter the line and then draw the graph and find the intersection. (See earlier sheets for more details.)</p> <p><b>[GRAPH]</b></p> <p><b>[2nd] [CALC] [5]</b></p>	<p>Intersection X=18.785892 Y=23</p>																																