GRAPHS AND STATISTICS: Regression – 45%

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The question may require you to write an exponential regression equation to model data. The question may also require you to use the equation to make a prediction.

The table below gives air pressures in kPa at selected altitudes above sea level measured in kilometers.

x	**Altitude** (km)	0	1	2	3	4	5
y	**Air Pressure** (kPa)	101	90	79	70	62	54

Write an exponential regression equation that models these data rounding all values to the *nearest thousandth*.

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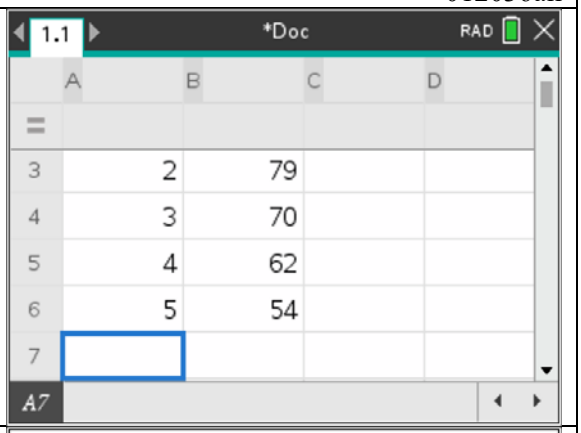
Add a Lists & Spreadsheet page.

Enter the *x* values in Column A and *y* values in Column B.

Click in Column A.



Enter menu, 4, 1, A to bring up this wizard.

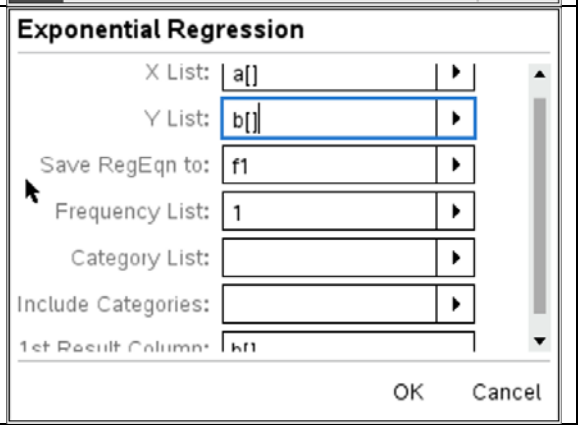
Because you clicked in Column A, X List is already filled in.

Enter b[] in the Y List.

Note the Regression Equation will be defined as f1.

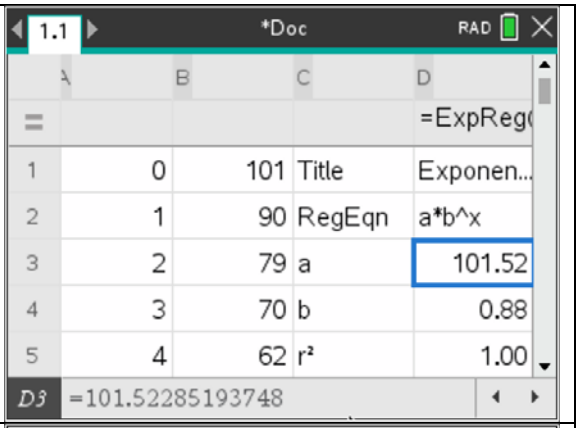
You can ignore the Frequency List.

Even though the last field states the Result will be placed in b[], this will automatically change to c[].

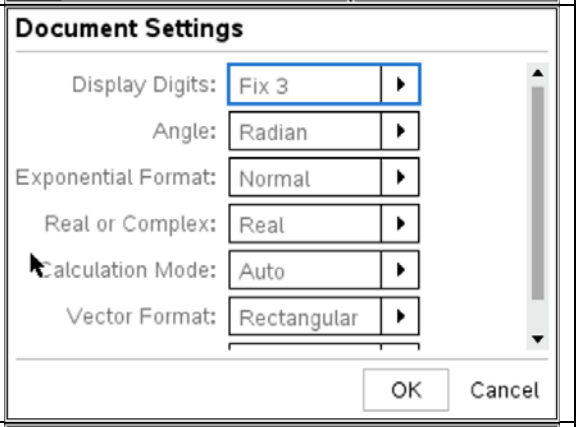


The output shows the regression equation in the form a*b^x.

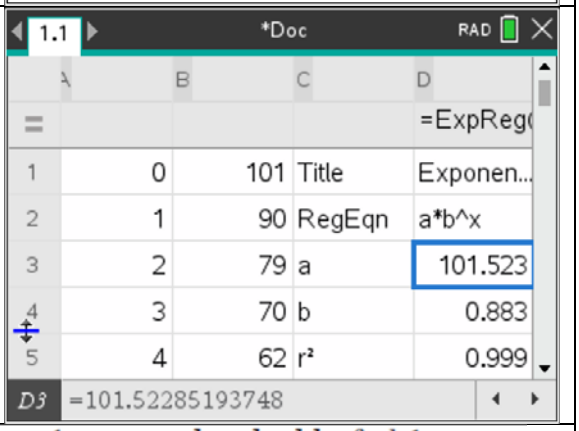
The values are rounded to the nearest hundredth, but the question requires rounding to the nearest thousandth. You may click on any value to see a more exact value at the bottom of the screen.



You may also correct the rounding by entering doc, 7, 2 and change the Display Digits to Fix 3. This only changes how many decimal places are displayed.



$y = 101.523 * 0.883^x$ is the correct response.



Use this equation to algebraically determine the altitude, to the *nearest hundredth* of a kilometer, when the air pressure is 29 kPa.

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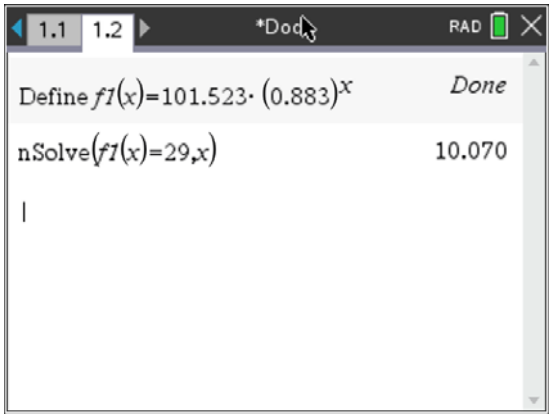
Add a Calculator page. Remember the Regression Equation is saved to f1. You must redefine f1 with correct rounding. Enter menu, 1, 2, f1 to bring up f1. Correct the rounding. Enter $f1(x) = 29$, ctrl, menu, 1, 2 10.07 is the correct response.	

Algebraic work similar to this is required for full credit:

$$29 = 101.523(.883)^x$$

$$\frac{29}{101.523} = (.883)^x$$

$$\log\frac{29}{101.523} = x\log(.883)$$

$$\frac{\log\frac{29}{101.523}}{\log(.883)} = x$$

$$x \approx 10.07$$

For more questions, go to https://www.jmap.org/htmlstandard/S.ID.B.6.htm.