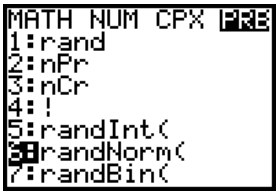
CHAPTER 11 INFERENCE FOR REGRESSION

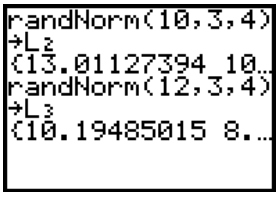
Section 11.1 ▪ Variation in the Estimated Slope

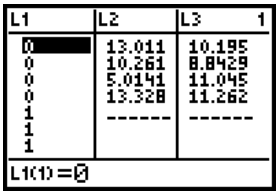
Activity 11.2 What Affects the Variation in b_1?



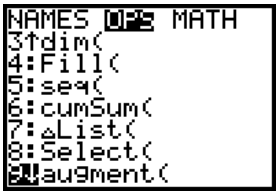
Use the TI-83 and TI-83 Plus's **randNorm(** command to generate the values from the normal, conditional distributions listed in each case. You find the **randNorm(** command by pressing MATH **PRB 6:randNorm(**. You generate n random numbers from a normal distribution with mean μ and standard deviation σ with an expression in the form **randNorm(**μ, σ, n**)**.

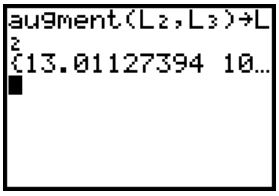
For example, for Case 1 in Activity 11.2, first define list L1 as {0, 0, 0, 0, 1, 1, 1, 1}. Define list L2 as **randNorm(10,3,4)**—four random values from a normal distribution with mean 10 and standard deviation 3. Similarly define list L3 as **randNorm(12,3,4)**.

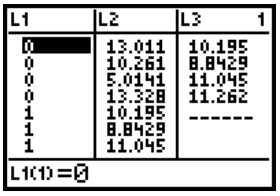




Now move the values in list L3 to the bottom of list L2 using the **augment(** command, found by pressing 2nd [LIST] OPS **9:augment(**. Store the results back in list L2.







You can now perform a linear regression, calculate the slope, and make a scatterplot using lists L1 and L2.

Section 11.2 ▪ Making Inferences About Slopes

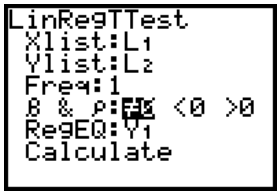
Significance Test for a Slope

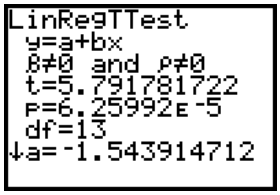
Check Conditions

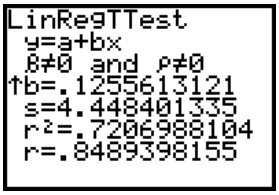
The TI-83 and TI-83 Plus can help check conditions for a significance test for a slope. As explained in Chapter 3 of this Calculator Guide, the calculator automatically calculates residuals and stores them in the list RESID after performing a regression. Therefore, you can easily make a residual plot, check that the residuals stay about the same size across all values of x, and make a univariate plot of the residuals to see if it's reasonable to assume that they came from a normal distribution.

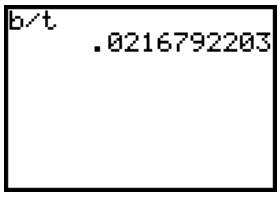
Compute Values STAT TESTS E:LinRegTTest

The TI-83 and TI-83 Plus conduct a significance test for a slope with the command **LinRegTTest**. You find this command by pressing STAT **TESTS E:LinRegTTest**. At the prompts, enter the lists containing the data and select two-tailed or the appropriate one-tailed test. At **RegEQ** you may specify a function in which the regression equation will be stored; this is optional. Select **Calculate** to get the test statistic, **t**; the *P*-value, **p**; the degrees of freedom, **df**; the coefficients of the regression equation, **a** and **b**; the standard error, **s**; and the correlation coefficient and the coefficient of determination, **r** and **r²**. Here's the price-versus-horsepower example from pages 647–649 of the *Statistics in Action* student text.









Note that the calculator's output does not include the standard error of the slope, s_{b_1}. However, because the null hypothesis is $\beta_1 = 0$, the formula for the test statistic is $t = \frac{b_1}{s_{b_1}}$. This means $s_{b_1} = \frac{b_1}{t}$, and the calculator does give you b_1 (called **b**) and t. So, to calculate s_{b_1}, divide **b/t**. Find **b** by pressing VARS **VARS 5:Statistics EQ 3:b**. Find **t** by pressing VARS **VARS 5:Statistics TEST 3:t**.

Section 11.3 ▪ Transforming for a Better Fit

Review Section 3.5 on pages 31–32 of this Calculator Guide for information about transformations to achieve linearity.