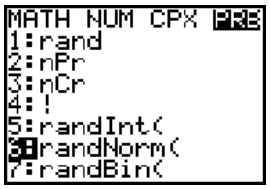
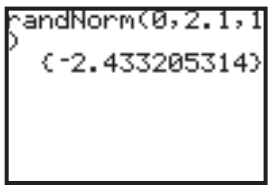
CHAPTER

11 Inference for Regression

Calculator Note 11A: Generating Random Values from a Normal Distribution

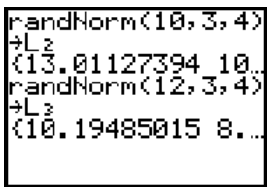
Use the calculator's **randNorm(** command to generate the values from the normal, conditional distributions listed in each case. You find the **randNorm(** command by pressing [MATH], arrowing over to **PRB**, and selecting **6:randNorm(**. You generate n random numbers from a normal distribution with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

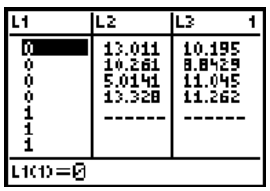




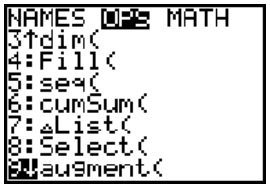
Calculator Note 11B: Augmenting a List

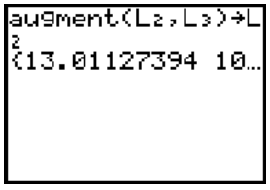
The augment command can speed up your work on Activity 11.1b. For example, for Case 1 in Activity 11.1b, first define list L1 as {0, 0, 0, 0, 1, 1, 1, 1}. Define list L2 as **randNorm(10,3,4)**—four random values from a normal distribution with mean 10 and standard deviation 3. Similarly define list L3 as **randNorm(12,3,4)**.

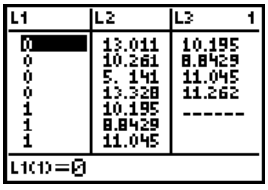




Now move the values in list L3 to the bottom of list L2 using the **augment(** command, found by pressing [2nd] [LIST], arrowing over to **OPS**, and selecting **9:augment(**. Your command will be **augment (L2, L3)→L2**. This stores the results back into list L_2.







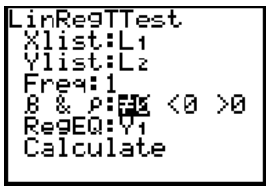
You can now perform a linear regression, calculate the slope, and make a scatterplot using lists L1 and L2.

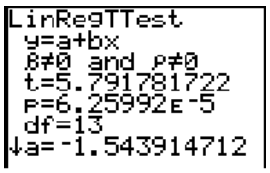
Calculator Note 11C: Checking Conditions for a Significance Test for a Slope

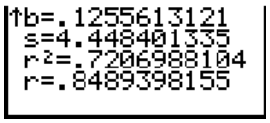
The TI-83 Plus and TI-84 Plus can help check conditions for a significance test for a slope. As explained in Calculator Note 3I, the calculator automatically calculates residuals and stores them in the list **RESID** after performing a regression. Therefore, you can easily make a residual plot, check 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.

Calculator Note 11D: Computing Values for a Significance Test for a Slope LinRegTTest

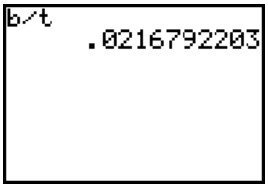
The TI-83 Plus and TI-84 Plus conduct a significance test for a slope with the command **LinRegTTest**. You find this command by pressing [STAT], arrowing over to **TESTS**, and selecting **E:LinRegTTest**. At the prompts, enter the lists containing the data and select the two-sided or the appropriate one-sided 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 are the computations for the price versus horsepower example from pages 759−760 of the student book.







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 that $s_{b_1} = \frac{b_1}{t}$, 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], selecting **5:Statistics** from the **VARS** menu, then arrowing over to **EQ** and selecting **3:b**. Find **t** by pressing [VARS], selecting **5:Statistics** from the **VARS** menu, then arrowing over to **TEST** and selecting **3:t**.



Calculator Note 11E: Computing a Confidence Interval Estimate for the True Slope LinRegTInt

The TI-83 Plus and TI-84 Plus compute a confidence interval for the true slope with the command **LinRegTInt**. You find this command by pressing STAT, arrowing over to **TESTS**, and selecting **G:LinRegTInt**. At the prompts, enter the lists containing the data and the desired confidence interval. At **RegEQ** you may specify a function in which the regression equation will be stored; this is optional. Select **Calculate** to get the confidence interval; the degrees of freedom, **df**; the slope coefficients of the regression equation, **a** and **b**; the standard error, **s**; and the correlation coefficient and the coefficient of determination, **r** and r^2. Here are the computations for the price versus horsepower example from page 763 of the student book.