3. What is the correlation between employee hours per vehicle and the automakers’ profit per vehicle for 2001?

4. From the correlation in question 4, can we conclude that more employee hours per vehicle probably caused less profit per vehicle in 2001? Explain your answer.

5. Agree or find a counterexample to the following statement: “In 2001, any company that required more employee hours per vehicle than others had less profit per vehicle.”

6. For each manufacturer listed, calculate the percent change in the number of employee hours per vehicle from 2000 to 2001.
Questions submitted by Margaret Cibes  
Hillyer College, University of Hartford, Hartford, CT 06117

Cingular advertisement  
The Hartford Courant, June 2, 2002

7. From the cellular telephone ad, we can use prices and minutes as coordinates for points on a graph. Do the points (39.99, 350), (49.99, 500), and (69.99, 850) lie on the graph of a linear function? If they do, use algebra to write an equation of the linear function. Otherwise, explain why they do not lie on the graph of a linear function.

8. Use technology to find the least-squares regression line determined by the points (39.99, 350), (49.99, 500), and (69.99, 850). Record the correlation coefficient.

9. Use technology to find the least-squares regression line determined by the three points in question 8, with the 3500 night and weekend minutes added to the included minutes for each of the given access fees. Record the correlation coefficient.

10. For questions 9 and 10, which regression line fits its points better? Explain.

11. Interpret the meaning of the slope and y-intercept in each regression equation. Include units.

12. Do the points (39.99, 350), (49.99, 500), and (69.99, 850) lie on the graph of a quadratic function? If they do, use algebra to write an equation of the quadratic function. If they do not, explain why not.

13. Use technology to fit a quadratic function to the points (39.99, 350), (49.99, 500), and (69.99, 850).

14. Compare your answer to question 13 with your answer to question 14.

15. For each plan, approximately how many hours would the customer be on the telephone each month if he or she used all the minutes available for a given monthly charge?

5. Two counterexamples can be found in the information given. Honda has more employee hours per vehicle than Nissan, but Honda also has more profit per vehicle. Similarly, DaimlerChrysler has more profit (or a smaller loss) per vehicle than Ford.

6. The percent changes in the number of employee hours per vehicle are as follows:
   - Nissan—an increase of 5.07 percent
   - Honda—an increase of 7.22 percent
   - Toyota—an increase of 1.61 percent
   - GM—a decrease of 2.96 percent
   - Ford—an increase of 2.51 percent
   - DaimlerChrysler—a decrease of 1.12 percent

7. No; for example, the slope between the first pair of points is 15, and the slope between the second pair is 17.5.

8. $y = 16.786x - 328.404; r = 0.9993$

9. For the points (39.99, 3850), (49.99, 4000), and (69.99, 4350), the equation is $y = 16.786x + 3171.596; r = 0.9993$.

10. No difference occurs in quality of fit (r-values), because each of the points in question 10 is the result of a horizontal shift (+3500 units) of each of the points in question 9, and horizontal shifts of points do not affect correlations.

11. In the first regression equation, the y-intercept is –328.404, which implies that a customer would have approximately –328 minutes for $0. In the second equation, the y-intercept is 3171.596, which implies approximately 3172 minutes for $0. Neither of these answers is

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**Cingular Nation Plans**

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<tbody>
<tr>
<td>Included Minutes Each Month</td>
<td>350</td>
<td>500</td>
<td>850</td>
</tr>
<tr>
<td><strong>Plus</strong> 3500 Night and Weekend Minutes each month</td>
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realistic. In both cases, the slope is 16.786, which implies that a customer gets about 17 extra minutes for every extra dollar spent.

12. Solve the following system of equations:

\[
\begin{align*}
350 &= a(39.99)^2 + b(39.99) + c \\
500 &= a(49.99)^2 + b(49.99) + c \\
850 &= a(69.99)^2 + b(69.99) + c
\end{align*}
\]

The quadratic function is given by

\[f(x) = 0.083x^2 + 7.502x - 83.258,\]

with each coefficient rounded to the nearest thousandth.

13. \[g(x) = 0.083x^2 + 7.502x - 83.258,\]

with each coefficient rounded to the nearest thousandth.

14. \[f(x) = g(x)\] because three points determine a unique quadratic function.

15. First plan: 64.17 hours
Second plan: 66.67 hours
Third plan: 72.5 hours

(Continued)