Exercise 3

For 2007–2009, Gallaway, Inc. has collected the following data on monthly sales  
of its Titan II driving club, where Q = the number of units sold per month.

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| Year Month Q Year Month Q Year Month Q 2007 January 6,942 2008 January 8,007 2009 January 7,925 |
| February 7,348 February 7,698 February 7,326 |
| March 7,328 March 7,417 March 8,037 |
| April 8,350 April 8,897 April 9,087 |
| May 8,619 May 8,607 May 9,303 |
| June 9,282 June 9,314 June 9,139 |
| July 8,183 July 8,686 July 8,105 |
| August 8,317 August 8,539 August 8,321 |
| September 8,552 September 8,967 September 8,960 |
| October 7,993 October 8,507 October 7,580 |
| November 8,198 November 8,359 November 8,562 |
| December 8,082 December 8,157 December 8,072 |

1. Management at Gallaway is concerned about sales. They would like to know if there is an upward trend is sales of the Titan II. Use the data above to estimate the monthly trend in sales using a linear trend model of the form: Qt = a + bt . Does your statistical analysis indicate a trend? If so, is it an upward or downward trend and how great is it? Is it a statistically significant trend (use the 5 percent level of significance)?
2. Now adjust your statistical model to account for seasonal variation in club sales. Estimate the following model of sales:

Qt = a + bt + c1D1t + c2D2t + c3D3t

Where D1t = 1 for the months of January–March or 0 otherwise, D2t = 1 for the months of April–June or 0 otherwise, and D3t = 1 for the months of July–September or 0 otherwise. Do the data indicate a statistically significant seasonal pattern (use the 5 percent level of significance)? If so, what is the seasonal pattern of sales of Titan II clubs?

1. Comparing your estimates of the trend in sales in parts *a* and *b*, which estimate is likely to be more accurate? Why?
2. Using the estimated forecast equation from part *b*, forecast sales of Titan II clubs for January 2010, January 2011, July 2010, and July 2011.