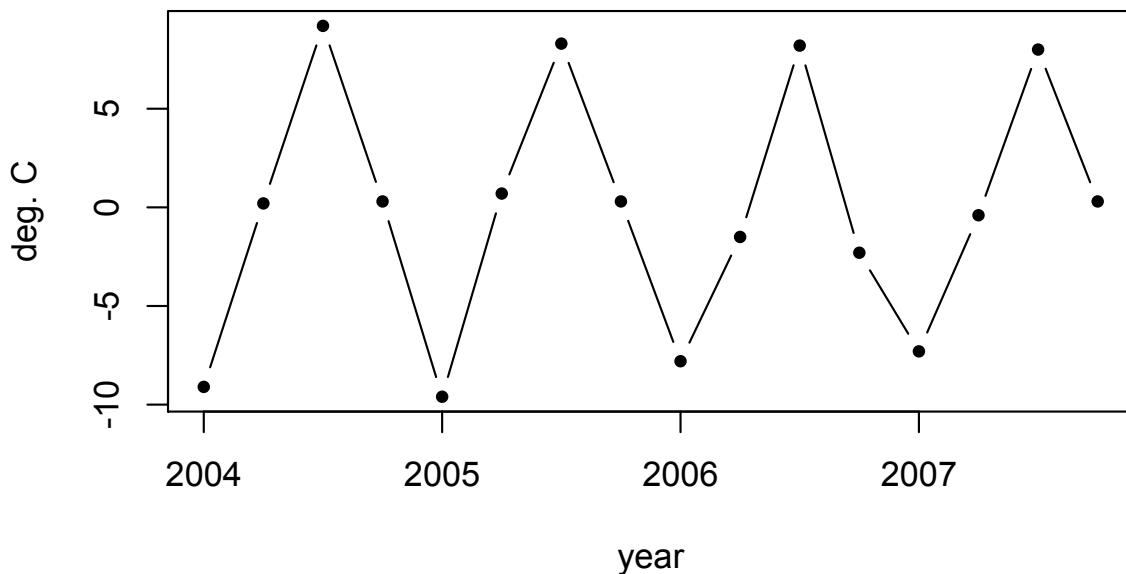


Activity: The Sample Autocorrelation

Recall the data on the daily minimum temperatures at Prince George, BC. Consider the quarterly means for the period 2004–2007. The figures are given below, along with the plot.

		Quarter			
		1	2	3	4
year	2004	-9.1	0.2	9.2	0.3
	2005	-9.6	0.7	8.3	0.3
	2006	-7.8	-1.5	8.2	-2.3
	2007	-7.3	-0.4	8.0	0.3
		-33.8	-1	33.7	-1.4

Quarterly min. temperature at Prince George



The sample mean of the series is $\bar{x} = -0.2$ and the standard deviation is $s = 6.2$ (in deg. C, both to 1 d.p. which is sufficient accuracy for here).

Recall:

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i, \quad s^2 = \frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})^2.$$

1. Without performing the calculation, provide a guess of the sample autocorrelation function (the sample acf, r_h) at lag 4. That is, have a guess at r_4 .
2. Using the formula, find r_4 from the data.

Recall:

$$r_h := \frac{\sum_{t=1}^{n-h} (x_t - \bar{x})(x_{t+h} - \bar{x})}{\sum_{t=1}^n (x_t - \bar{x})^2} \quad (h = 1, 2, \dots, n-1)$$

3. Without performing the calculation, provide a guess of the sample autocorrelation function (the sample acf, r_h) at lag 2. That is, have a guess at r_2 .
4. Using the formula, find r_2 from the data.
5. Without performing the calculation, provide a guess of the sample autocorrelation function (the sample acf, r_h) at lag 1. That is, have a guess at r_1 .
6. Using the formula, find r_1 from the data.
7. A plot of r_h against the lag h is known as the *correlogram*. Sketch what you think the correlogram would look like here for lags between $h = 0$ and $h = 8$.