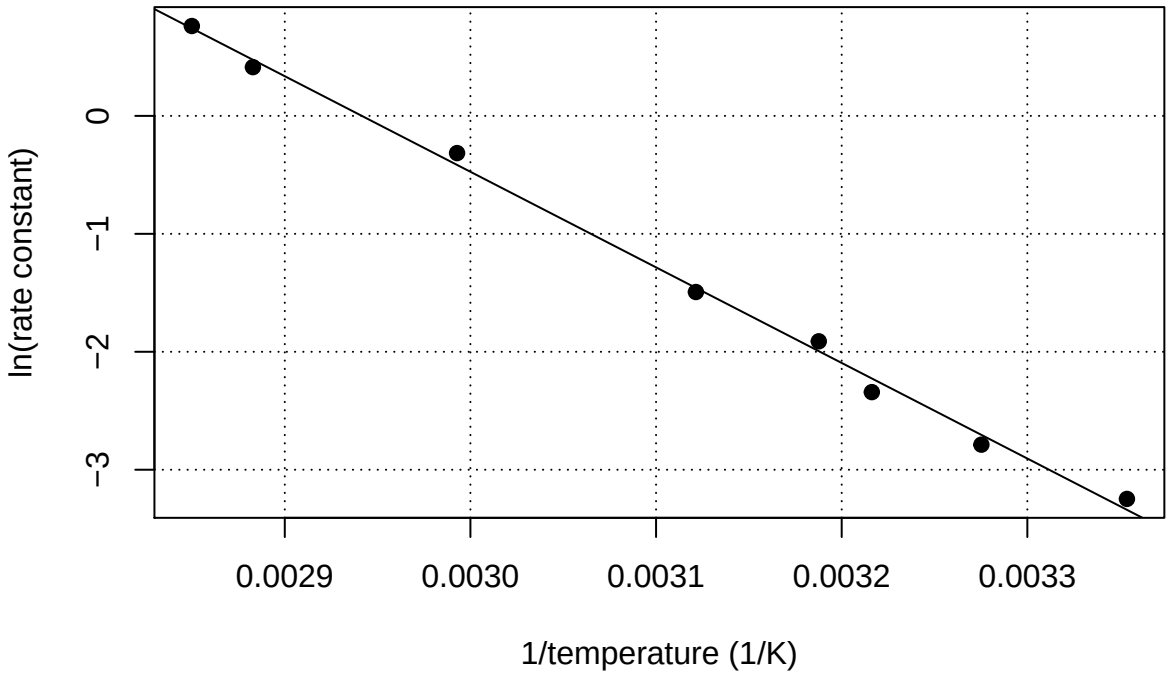
Key for Take-Home Assignment 09

The following data was collected during the study of the reaction $\mathrm{A}(g) + 2\,\mathrm{B}(g) \longrightarrow \mathrm{AB_2}(g)$, which is known to follow the rate law $R = k[\mathrm{A}][\mathrm{B}]$. A study of the reaction at different temperatures yields the following values for the reaction's rate constant.

temperature (K)	rate constant (1/(M s))
298	3.89e-02
305	6.16e-02
310	9.61e-02
313	1.48e-01
320	2.25e-01
334	7.30e-01
346	1.51e+00
350	2.14e+00

Use this data to determine the reaction's activation energy, reporting its value in $\mathrm{kJ/mol_{rxn}}$. Your sample id is 14g.

To determine the activation energy we first plot the data $\ln(k)$ as a function of $1/T$ and complete a regression analysis to find the slope, which is equivalent to $-\frac{E_a}{R}$.



The slope of the line is -8104.15 $\mathrm{K^{-1}}$, which gives an activation energy of 67.4 kJ/mol.