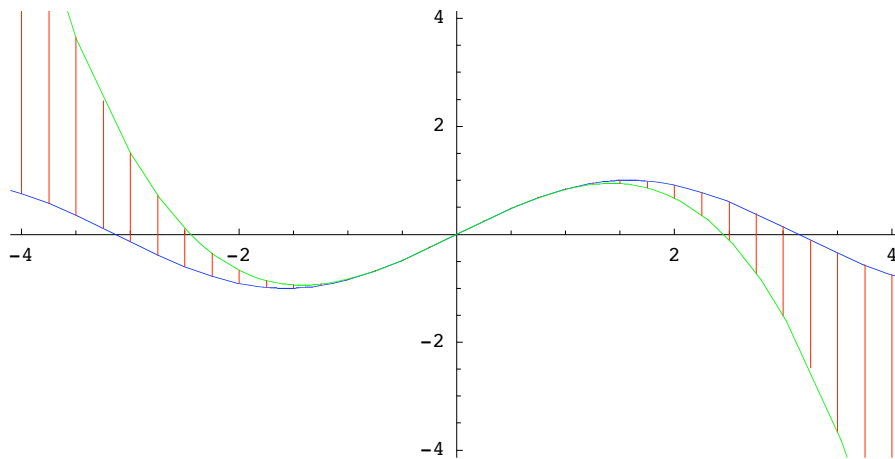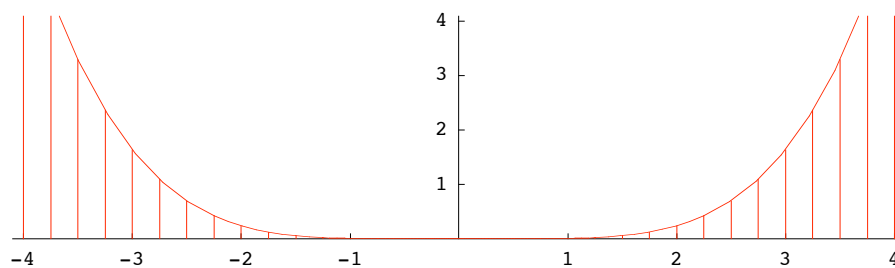# Error in approximating $f(x) = \sin x$ by $p_3(x) = x - \frac{1}{3!}\, x^3$

The first plot shows the graphs of $f(x) = \sin x$ (in blue) and $p_3(x) = x - \frac{1}{3!}\, x^3$ (in green). The red lines show the difference between $f(x)$ and $p_3(x)$.

The second plot shows the difference as a function. This is the absolute value of the remainder term which we denote by $|R_3(x)|$.

In the third plot, the red graph is the same as the previous plot. The black graph is an upper bound on the error given by $|R_3(x)| \leq \frac{M_4}{4!}\, x^4 = \frac{1}{4!}\, x^4$.