

# Explanations of methods

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**Euler method:** The main idea of Euler method is to plot a function, which makes an approximation to the exact solution. How would we do that? We use slope of tangent lines to the original curve at some points  $x$ , so that all these pieces (lines from  $x_i, y_i$  to  $x_{i+1}, y_{i+1}$ ) will be parallel to the original plot at point  $x_i, y_i$ . To count parallel pieces we consider our plot as some function of original function's derivative.

**Improved Euler method:** The idea is just the same as for Euler method, but we need our pieces from  $x_i, y_i$  to  $x_{i+1}, y_{i+1}$  to be parallel not to the original plot in  $x_i, y_i$ , but in  $\frac{x_i+x_{i+1}}{2}$  (so in the center of our original piece).

**Runge-Kutta method:** The idea of this method is not trivial at all, but we consider some approximation of 4 different point on this piece from  $x_i, y_i$  to  $x_{i+1}, y_{i+1}$  using some coefficients, instead of a half of our exact plot's piece to make a slope of it's tangent line.