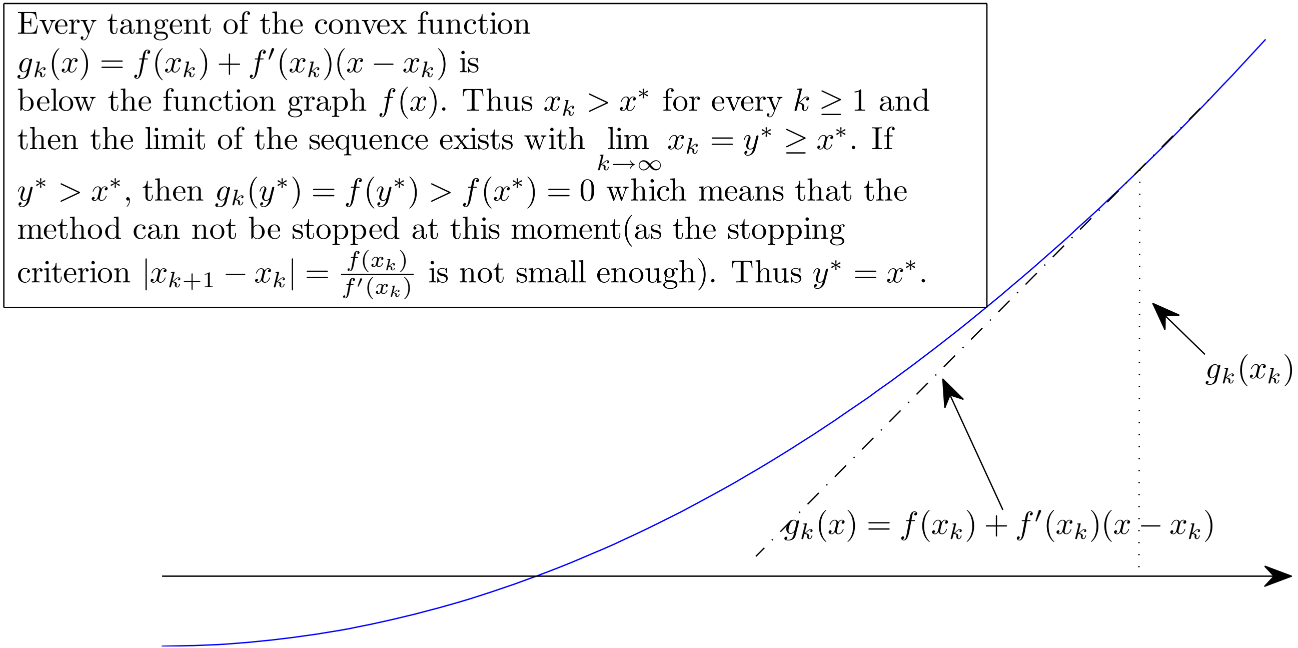
Every tangent of the convex function
$g_k(x) = f(x_k) + f'(x_k)(x - x_k)$ is
below the function graph $f(x)$. Thus $x_k > x^*$ for every $k \geq 1$ and
then the limit of the sequence exists with $\lim_{k\to\infty} x_k = y^* \geq x^*$. If
$y^* > x^*$, then $g_k(y^*) = f(y^*) > f(x^*) = 0$ which means that the
method can not be stopped at this moment(as the stopping
criterion $|x_{k+1} - x_k| = \frac{f(x_k)}{f'(x_k)}$ is not small enough). Thus $y^* = x^*$.
$g_k(x_k)$
$g_k(x) = f(x_k) + f'(x_k)(x - x_k)$