Algorithm 1: Richardson's method

x_0 given
$r_0 = b - A\,x_0$
$k = 0$
repeat
  $p_k = r_k$
  $\alpha_k = \tau$
  $x_{k+1} = x_k + \alpha_k\, p_k$
  $r_{k+1} = r_k - \alpha_k\, Ap_k \qquad = b - A\,x_{k+1}$
  $k = k + 1$
until *stopping criterion fulfilled, e.g.* $\|r_k\|_{\ell^2} \leq \varepsilon\, \|r_0\|_{\ell^2}$

Algorithm 2: Method of steepest descent

x_0 given
$r_0 = b - A\,x_0$
$k = 0$
repeat
  $p_k = r_k$
  $\alpha_k = \frac{(r_k, p_k)}{(p_k, Ap_k)}$
  $x_{k+1} = x_k + \alpha_k\, p_k$
  $r_{k+1} = r_k - \alpha_k\, Ap_k \qquad = b - A\,x_{k+1}$
  $k = k + 1$
until *stopping criterion fulfilled, e.g.* $\|r_k\|_{\ell^2} \leq \varepsilon\, \|r_0\|_{\ell^2}$

Algorithm 3: Conjugate gradient method

x_0 given
$r_0 = b - A\,x_0$
$k = 0$
repeat
  if $k = 0$ **then**
    $p_k = r_k$
  else
    $\beta_{k-1} = -\frac{(r_k, Ap_{k-1})}{(p_{k-1}, Ap_{k-1})}$
    $p_k = r_k + \beta_{k-1}\, p_{k-1}$
  end
  $\alpha_k = \frac{(r_k, p_k)}{(p_k, Ap_k)}$
  $x_{k+1} = x_k + \alpha_k\, p_k$
  $r_{k+1} = r_k - \alpha_k\, Ap_k \qquad = b - A\,x_{k+1}$
  $k = k + 1$
until *stopping criterion fulfilled, e.g.* $\|r_k\|_{\ell^2} \leq \varepsilon\, \|r_0\|_{\ell^2}$