Gradient Descent Routines

Simple

Input: step size γ
Input: starting point $\vec{a}_0$

Initialize $n = 0$
while *stopping criteria not met* **do**
  $\vec{a}_{n+1} = \vec{a}_n - \gamma \nabla F(\vec{a}_n)$
  $n \leftarrow n + 1$
end
return $\vec{a}_n$

Experimental

Input: step size γ
Input: starting point $\vec{a}_0$

Initialize $\gamma^* = \gamma$,$g = \nabla F(\vec{a}_0)$, $\vec{a}_{old} = \vec{a_0}$, $\vec{a}_{new} = \vec{a_{old}} - \gamma^* g$
while *stopping criteria not met* **do**
  while $F(\vec{a}_{new}) < F(\vec{a}_{old})$ **do**
    $\gamma^* = 2 * \gamma^*$
    $\vec{a}_{old} = \vec{a}_{new}$
    $\vec{a}_{new} = \vec{a}_{new} - \gamma^* * g$
  end
  $g = \nabla F(\vec{a}_{old})$
  $\vec{a}_{new} = \vec{a}_{old} - \gamma * g$
  $\gamma^* = \gamma$
end
return $\vec{a}_{old}$