- Define

$$RHS(a_1; \varepsilon) = \frac{1}{2} f(a_1; \varepsilon) + \frac{1}{2} f(a_1; -\varepsilon)$$

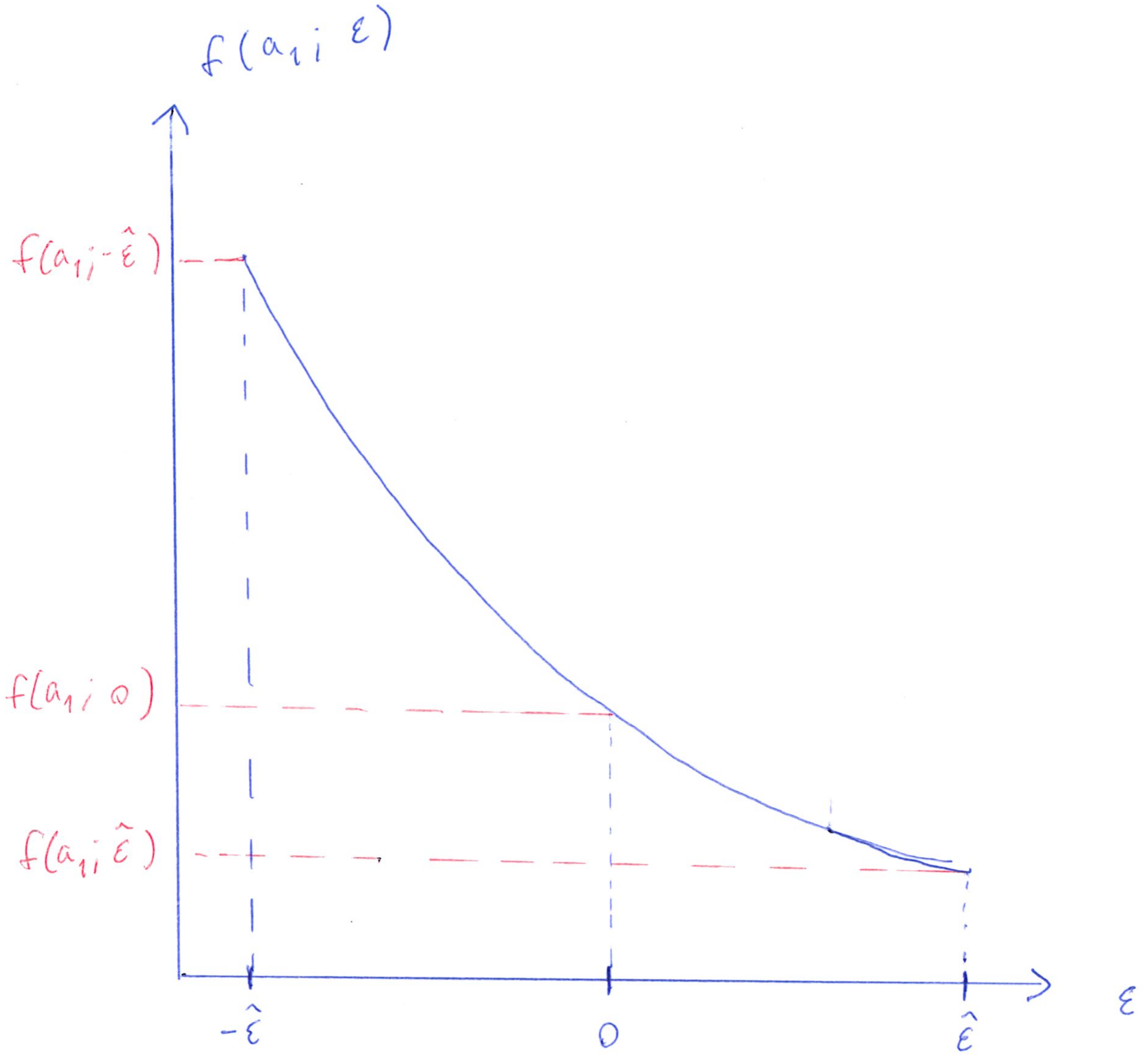
where

$$f(a_1; \varepsilon) = u'(Ra_1 + \bar{y}_1 + \varepsilon)$$

- suppose $a_1(\varepsilon)$ solves

$$u'(y_0 - a_1) = RHS(a_1, \varepsilon) \qquad (EE)$$

Case 2: $u''' > 0$



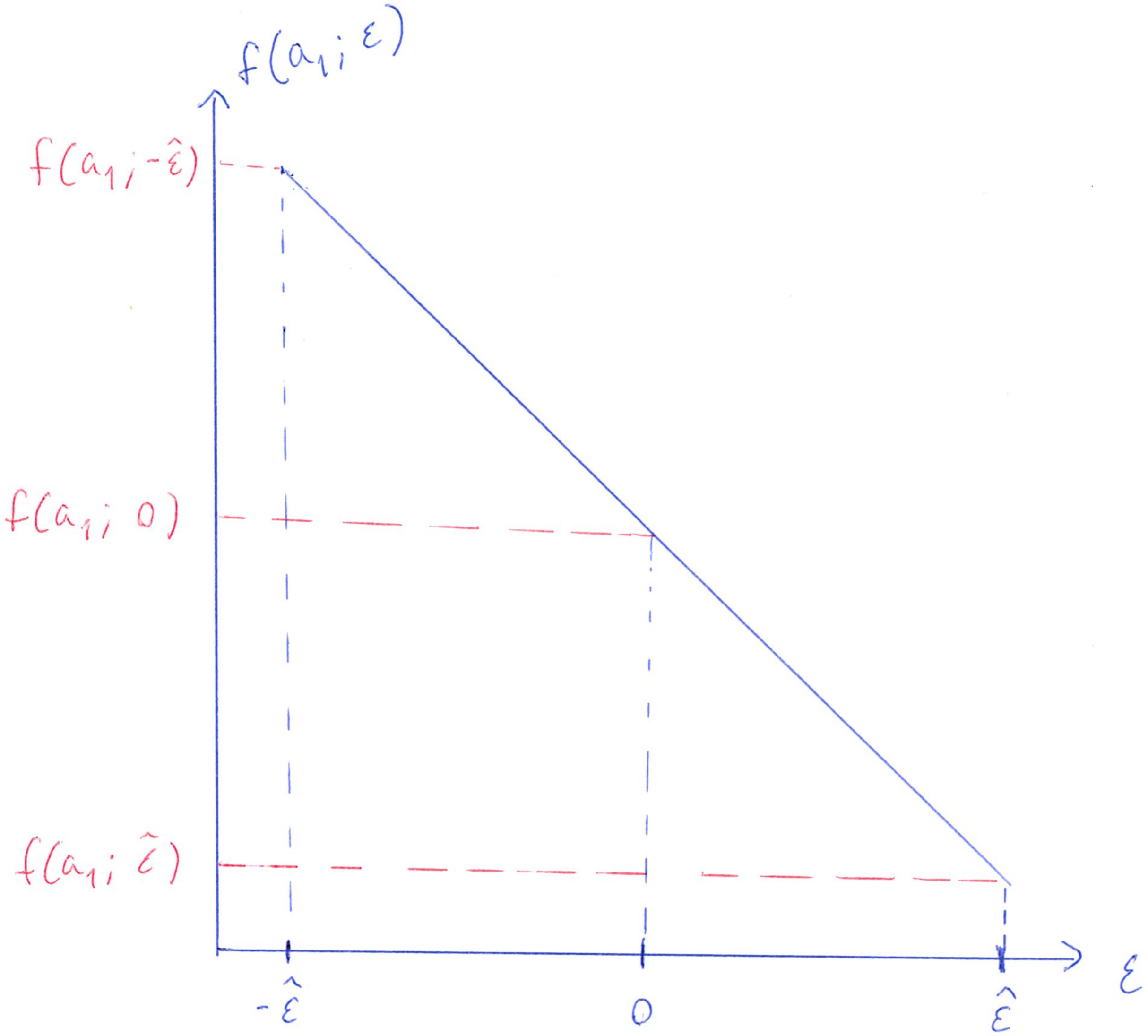
$$
\begin{aligned}
RHS(a_1, 0) &= f(a_1; 0) \\
&< \frac{1}{2} f(a_1; \hat{\varepsilon}) + \frac{1}{2} f(a_1; -\hat{\varepsilon}) \\
&= RHS(a_1, \hat{\varepsilon})
\end{aligned}
$$

$\Rightarrow \; a_1(\hat{\varepsilon}) > a_1(0)$

Case 3: $u''' < 0$

$\Rightarrow \; a_1(\hat{\varepsilon}) < a_1(0)$

Case 1: $u''' = 0$



$$\begin{aligned} RHS(a_1; 0) &= f(a_1; 0) \\ &= \frac{1}{2} f(a_1; -\hat{\varepsilon}) + \frac{1}{2} f(a_1; \hat{\varepsilon}) \\ &= RHS(a_1; \hat{\varepsilon}) \end{aligned}$$

$$\Rightarrow a_1(\hat{\varepsilon}) = a_1(0)$$