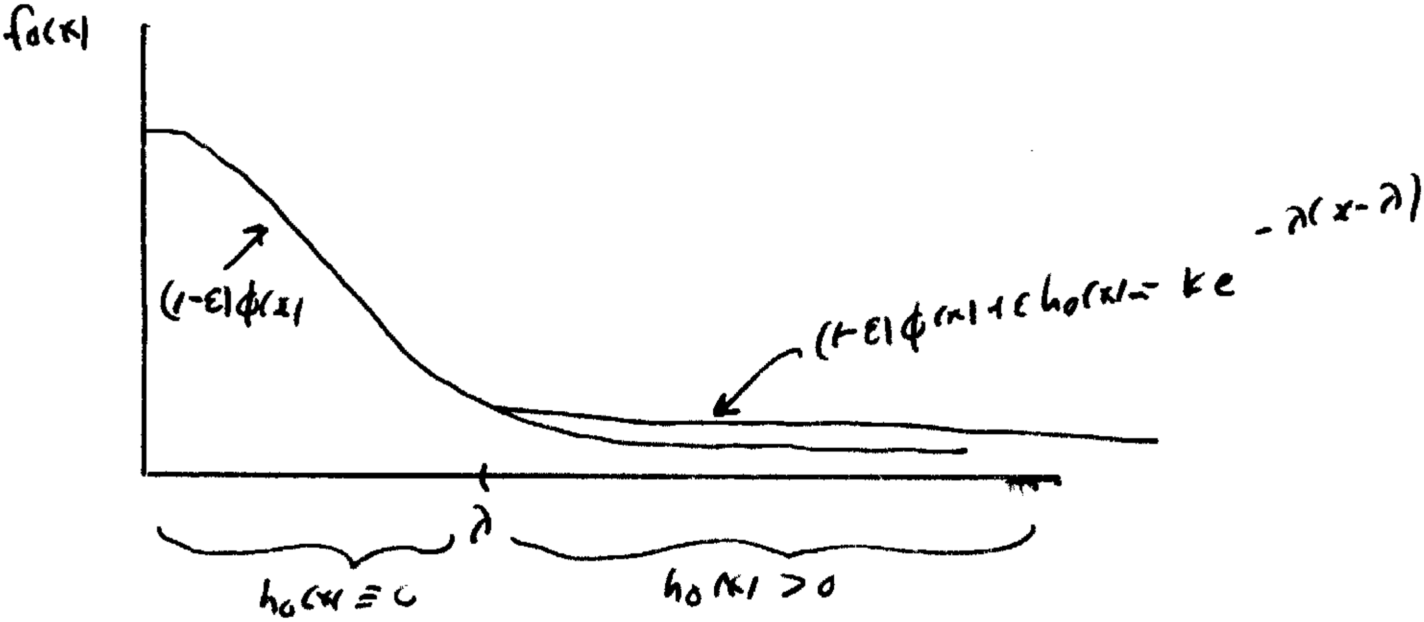
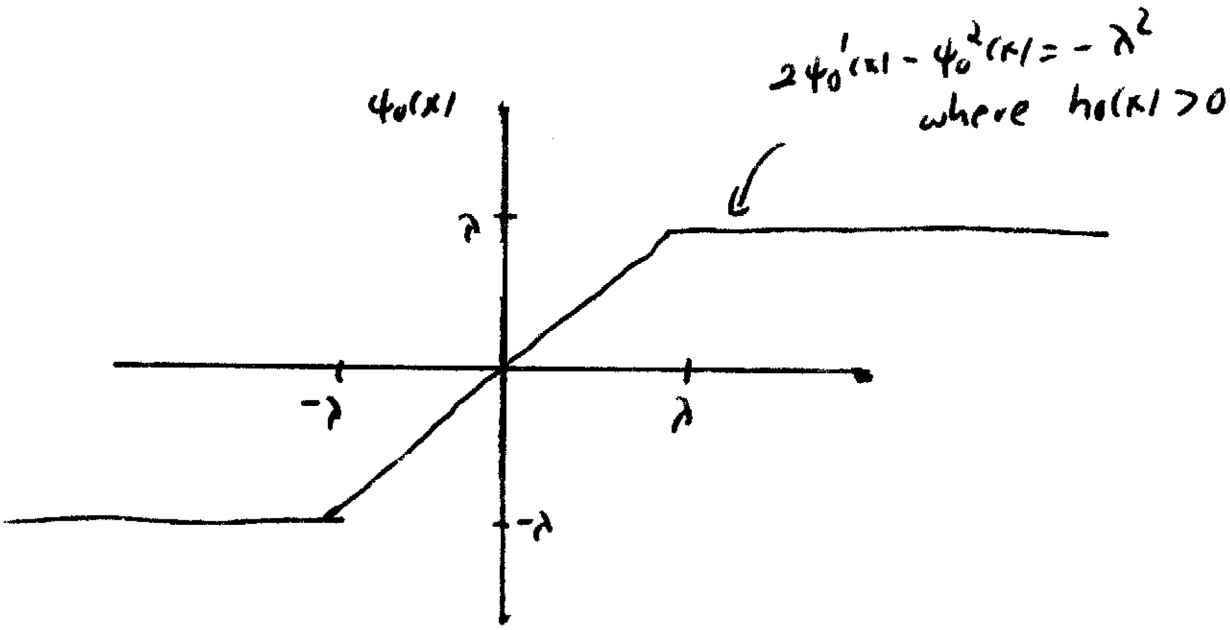
$$\mathcal{G}_\varepsilon: \quad f(x) = (1-\varepsilon)\phi(x) + \varepsilon h(x)$$





(k, λ): i) $f_0(\lambda^-) = f_0(\lambda^+)$

ii) $\int f_0 \, dx = 1$

$$\lambda = \lambda(\varepsilon) \longrightarrow \begin{cases} 0, & \varepsilon \to 1 \quad (\hat{\theta} \to \text{median}) \\ \infty, & \varepsilon \to 0 \quad (\hat{\theta} \to \text{sample mean}) \end{cases}$$

$\mathcal{G}_\varepsilon$: $f = (1-\varepsilon)g + \varepsilon h$

$g(x) = \text{Cauchy} = \dfrac{1}{\pi(1+x^2)}$

$f_0 = (1-\varepsilon)g + \varepsilon h_0 = \kappa \cosh^2\left(-\frac{\lambda}{2}(x-\omega)\right)$

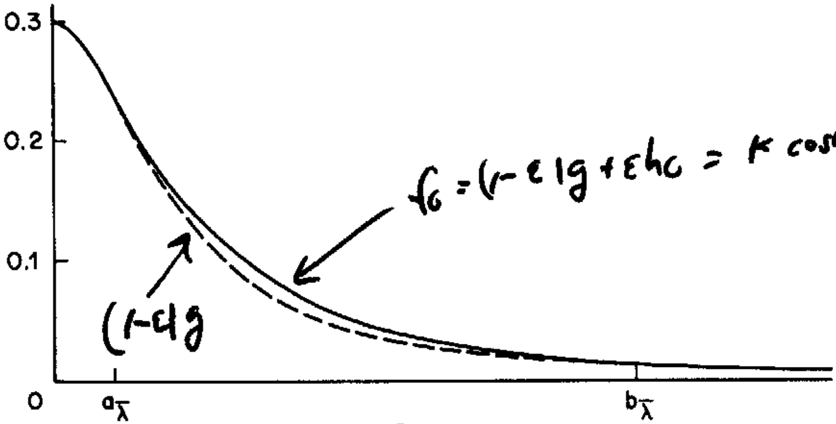


FIG. 1. *Cauchy density* $(1-\varepsilon)\cancel{h_0}\,g$ (– – –) *and least favorable* f_0 (———).

$\psi_0(x) = \lambda \tanh\left(-\frac{\lambda}{2}(x-\omega)\right)$

$(2\psi_0' - \psi_0^2 = -\lambda^2$ where $h_0 > 0)$

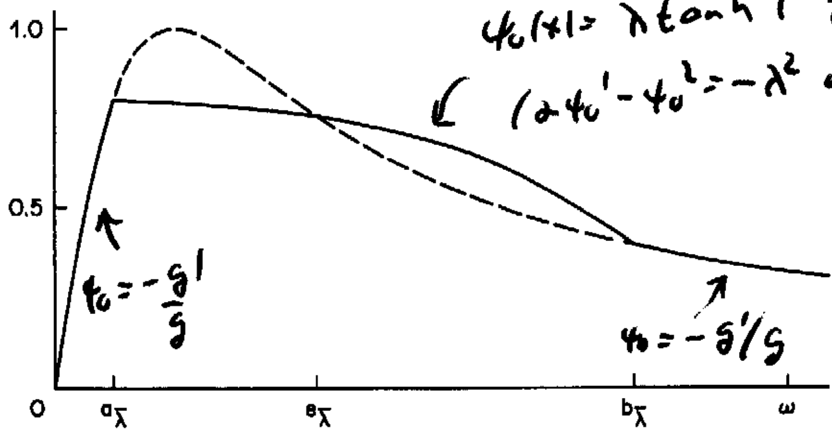
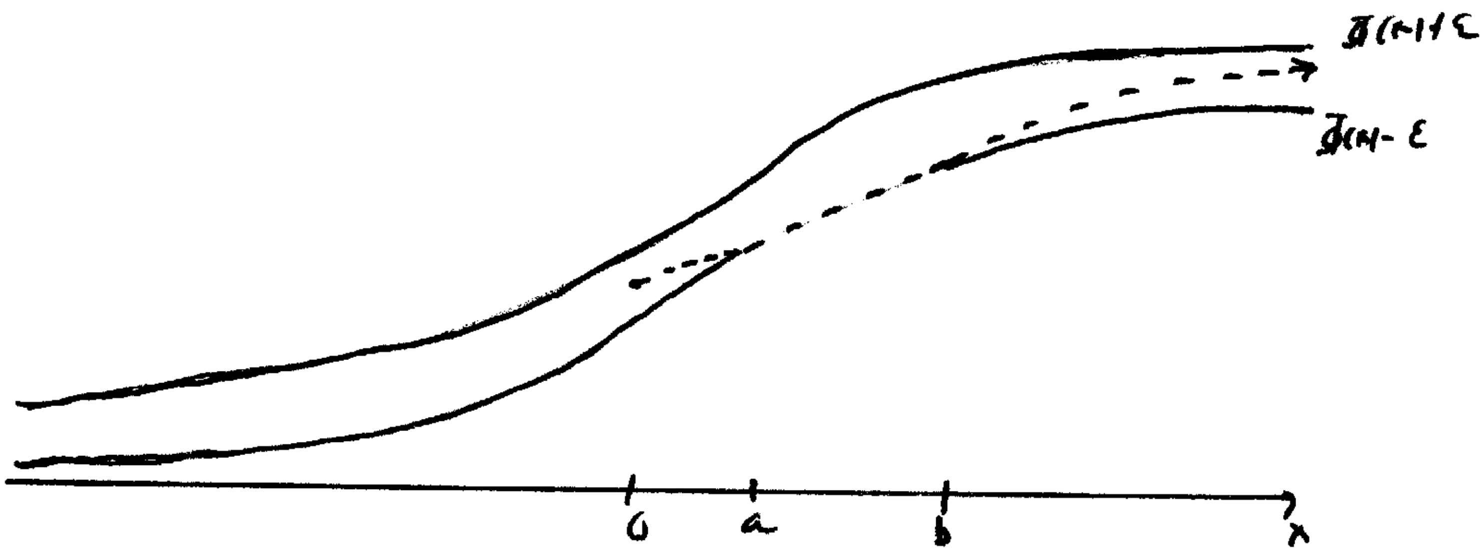


FIG. 2. $\zeta = \cancel{-h'/h}\ -g'/g$ (– – –) *and* $\psi_0 = -f_0'/f_0$ (———).

A3

$K_\varepsilon : \quad |F(x) - \Phi(x)| \le \varepsilon \quad \forall x$



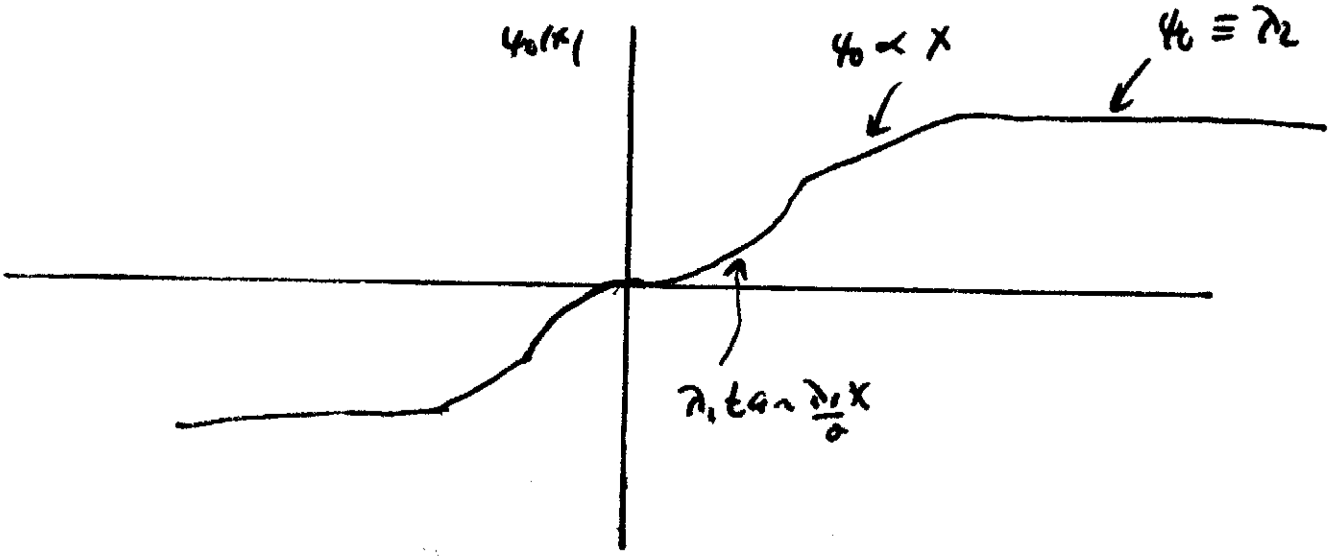
On $[0,a]$: $f_0(x) \propto \cos^2 \frac{\lambda_1 x}{2}$ $\qquad \psi_0(x) = \lambda_1 \tan \frac{\lambda_1 x}{2}$

$[a,b)$: $F_0(x) = \Phi(x) - \varepsilon$

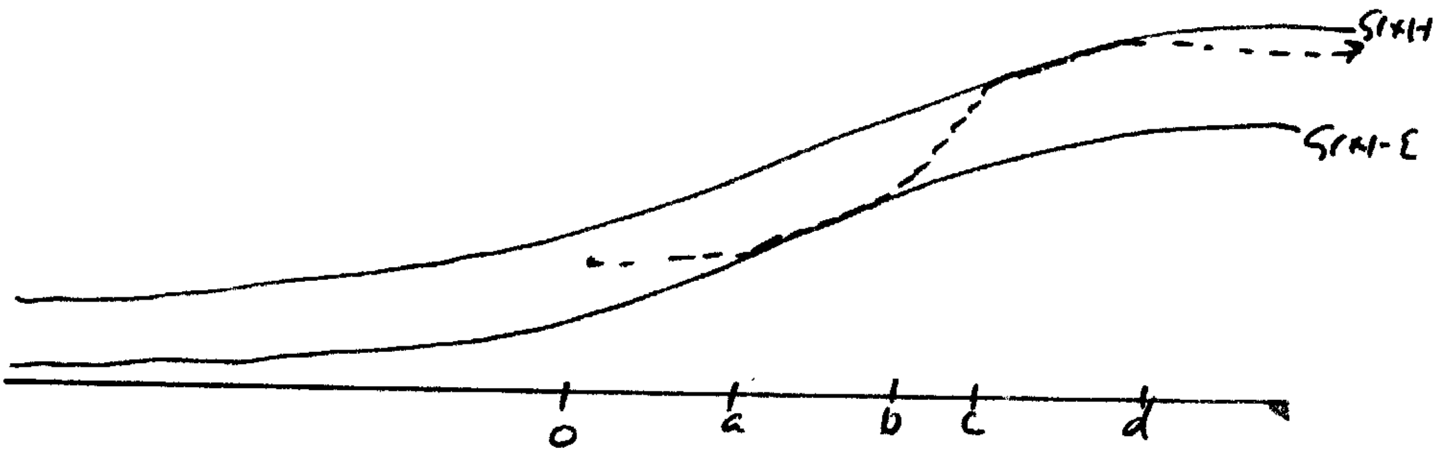
$[b,\infty)$: $f_0(x) \propto e^{-\lambda_2(x-b)}$ $\qquad \psi_0(x) = \lambda_2$

$\varepsilon \le .0303$: $a < b$

$\varepsilon \ge .0303$: $a = b$



K_ε : G = Cauchy



On $[0,a]$, $[b,c]$, $[d,\infty)$: $2\psi_0' - \psi_0^2 =$ constant

$[a,b]$: $F_0(x) = G(x) - \varepsilon$

$[c,d]$: $F_0(x) = G(x) + \varepsilon$

Small ε ($\varepsilon \lesssim .005$) $\qquad a < b, \quad c < d$

Larger ε $\qquad a = b, \quad c < d$

Larger ε yet $\qquad a = b, \quad c = d$

Largest ε $\qquad$ Like "$\varepsilon > .03$" solution when $G = \Phi$.