Symbol	Description	First Slide
X	Typical random variable of interest	3
f	Density of X; *unknown*; $f \in L_2(\mathbb{R})$	3
ε	Typical error random variable, $X \perp \varepsilon$	3
g	Density of ε; *known*; even; a.e. non-zero Fourier trans.	3
Y	$Y = X + \varepsilon$; typical observed random variable	3
h	$h = g * f$; Density of Y; *unknown*; to be estimated	3
$\tilde{f}, \tilde{g}, \tilde{h}$	Twiddle always denotes Fourier transform $\tilde{f}(\omega) = \int e^{-i\omega x} f(x)\, dx$	6
$\\| \cdot \\|$	Standard L_2 norm: $\\|f\\|^2 = \int \|f\|^2$	6
h_n	Density estimate of h from $Y_1, \ldots, Y_n$ i.i.d. as Y (any $L_2(\mathbb{R})$-consistent method)	10
T	Operator $L_2(\mathbb{R}) \to L_2(\mathbb{R})$ mapping $v \mapsto g * v$	10
$\\|g * v - h_n\\|^2 + \alpha\\|v^{(2)}\\|^2$	"Tikhonov functional" considered as a map $v \mapsto \\|g * v - h_n\\|^2 + \alpha\\|v^{(2)}\\|^2$	15
f_n^α	**Our estimate of** f; the v minimizing above Tikhonov functional	15
$\tilde{\varphi}_\alpha(\omega)$	$\tilde{\varphi}_\alpha(\omega) = \frac{\tilde{g}(\omega)}{\tilde{g}(\omega)^2 + \alpha\omega^4}$; satisfies $\tilde{f}_n^\alpha = \tilde{\varphi}_\alpha \tilde{h}_n$.	17
f^α	$f^\alpha = \arg\min_v \\|g * v - h\\|^2 + \alpha\\|v^{(2)}\\|^2$; i.e. minimizer of Tikhonov functional for *exact* density h	24
δ_n^2	$\delta_n^2 = \mathbb{E}\\|h_n - h\\|^2$; the MISE of estimator h_n of h	26
$W(\cdot)$	Lambert W function; $t = W(x)$ solves $te^t = x$; $W(x) \sim \log(x)$ as $x \to \infty$	30
$\mathcal{C}$	$\mathcal{C} = \{v \in L_2(\mathbb{R}), v \text{ is a pdf}\}$; set of square-integrable pdfs	31
P_A	$P_A u = \arg\min_{v \in A} \\|v - u\\|$; metric projection of u to closed, convex A	31
$\mathring{f}_n^\alpha$	f_n^α projected to some set of pdfs	31
$\mathcal{C}_t$	$\mathcal{C}_a = \{v \in \mathcal{C}, v(x) = 0\ \forall x \notin [-t, t]\}$; set of square-integrable pdfs with support in $[-t, t]$	32
$\mathscr{S}$	$\mathscr{S} = \mathscr{S}(\{t_i\})$; Space of cubic splines with knots $\{t_i\}$	36
B_i	B-spline basis functions for $\mathscr{S}$	37
$\mathbf{M}, \mathbf{P}, \mathbf{G}$	Inner-product matrices for $g * B_i$, $B_i^{(2)}$, and B_i, respectively	38