

**18.466 Problem Set 8 Spring 2016**  
**Mathematical Statistics**  
**Due Date: 4/26/2016**

Problems from Bickel and Doksum, 2nd Ed. [*Chapter.Section.Problem*]

1. 5.1.3

2. 5.1.5 (Correction): Suppose  $\lambda : R \rightarrow R$  has  $\lambda(0) = 0$ , is bounded and has bounded second derivative  $\lambda''$ .

If  $X_1, \dots, X_n$  are i.i.d., with  $E[X_1] = \mu$ , and  $\text{var}[X_1] = \sigma^2 < \infty$ , then show that

$$E\lambda(|\bar{X} - \mu|) = \lambda'(0) \frac{\sigma}{\sqrt{n}} \sqrt{\frac{2}{\pi}} + O\left(\frac{1}{n}\right) \text{ as } n \rightarrow \infty.$$

3. 5.2.2

4. 5.3.5 (Correction of typo “=”  $\rightarrow$  “ $\leq$ ”) Let  $X_1, \dots, X_n$  be i.i.d.  $R$  valued with  $EX_1 = 0$  and  $E|X_1|^j < \infty$ . Show that

$$\sup\{|E(X_{i_1} \times X_{i_2} \times \dots \times X_{i_j})| : 1 \leq i_k \leq n; k = 1, \dots, j\} \leq E|X_1|^j.$$

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