STATS 300A THEORY OF STATISTICS Stanford University, Fall 2015

Problem Set 6

Due: Thursday, November 12, 2015

Reading: TSH 3.1-3.2, 3.4

Instructions:

- You may appeal to any result proved in class or proved in the course textbooks.
- Any request to "find" requires proof that all requested properties are satisfied.

Problem 1 (TSH 3.2).

Problem 2 (TSH 3.7).

Problem 3 (TSH 3.16). Based on X with distribution indexed by $\theta \in \Omega$, the problem is to test $\theta \in \Omega_0$ versus $\theta \in \Omega_1$. Suppose there exists a test ϕ such that $\mathbb{E}_{\theta}[\phi(X)] \leq \beta$ for all $\theta \in \Omega_0$ where $\beta < \alpha$. Show there exists a level α test $\phi^*(X)$ such that

 $\mathbb{E}_{\theta}\left[\phi(X)\right] \leq \mathbb{E}_{\theta}\left[\phi^*(X)\right],$

for all $\theta \in \Omega_1$, and this inequality is strict if $\mathbb{E}_{\theta} [\phi(X)] < 1$.

Problem 4 (TSH 3.17).

Problem 5 (TSH 3.34).