

Sta 731 - Homework 5

Due Thursday, 10/18

1. If $E(X)$ exists, $E(cX) = cE(X)$ for $c \in \mathbb{R}$.
2. Let $f : (\mathbb{R}, \mathcal{B}(\mathbb{R})) \mapsto (\mathbb{R}, \mathcal{B}(\mathbb{R}))$ be monotone increasing (i.e., $s < t$ implies $f(s) \leq f(t)$). Show that f is measurable.
3. Let B_1, \dots, B_n be independent events. Show

$$P\left(\bigcup_{i=1}^n B_i\right) = 1 - \prod_{i=1}^n (1 - P(B_i))$$

4. Suppose X is a random variable. Show that X is independent of itself if and only if there is some constant c such that $P(X = c) = 1$.