Quiz Problem 10

$X \sim \text{Bin}(6, p)$

$H_0: p = 1/2$ vs $H_a: p = 1/5$, $X \leq 1$

$R = \{x \mid x \leq 1\}$

$\beta(p) = P_p(X \in R) = P_p(X \leq 1)$

$= P(X=0) + P(X=1) = \binom{6}{0} p^0 (1-p)^6 + \binom{6}{1} p^1 (1-p)^5$

$= (1-p)^6 + 6p(1-p)^5$

$\alpha = \max_{p \in \theta_0} \beta(p) = \max_{p = 1/2} \beta(p) = (1/2)^6 + 3(1/2)^5$

$= 0.10937$