1. [IPM10e] Exercise 10.6

2. Prove that

\[ P(\max_{0 \leq s \leq t} B(s) > a | B(t) \geq B(s) \text{ for all } 0 \leq s \leq t) = e^{-a^2/2t}. \]

Hint: Let \( W(t) = \max_{0 \leq s \leq t} B(s) \) and \( Y(t) = W(t) - B(t) \). Use the joint distribution of \( W(t) \) and \( Y(t) \) we derived in Lecture 23.