1. Suppose $X_1, X_2, \ldots, X_n \overset{iid}{\sim} N(\mu, \sigma^2)$ and S is the sample standard deviation. Find $E(S^6)$ (Hint: Use a moment generating function).

2. Consider the statistics in Theorem 9.2.1 and Theorem 9.2.3.

   (a) Suppose $m = n$ then show the statistics and distributions are exactly the same if we let $\hat{\theta} = 1$ (i.e. we assume the variances are the same which is the underlying assumption of Theorem 9.2.2).

   (b) Why was the assumption $m = n$ needed?