Question 5:

Notice:

$$std\big(med(X) - med(Y)\big) = \sqrt{var\big(med(X) - med(Y)\big)} = \sqrt{var\big(med(X)\big) + var\big(med(Y)\big)}$$

Therefore, we are required only to estimate the variance of the median.

In order to do so, we calculate the empirical CDF of the data, denoted $\widehat{F_n^X}$.

For $i = 1, \dots, B$:

Sample n data points from X, denoted $X_1^b, X_2^b, \dots$

Calculate $\widehat{T_b} = med\big(X_1^b, \dots, X_n^b\big)$

The estimator for $Var(T)$ is hence:

$$\frac{1}{B}\sum_{b=1}^{B}\big(\widehat{T_b}\big)^2 - \left(\frac{1}{B}\sum_{b=1}^{B}\widehat{T_b}\right)^2$$

The same goes for Y, so we plug back into the original formula:

$$std\big(med(X) - med(Y)\big) = \sqrt{var\big(med(X)\big) + var\big(med(Y)\big)}$$