Q2.1. $\because$ $n = 100 \gg 1$, a 95% CI for μ_x is $\bar{X}_n \pm 1.96\sqrt{\frac{S_x^2}{n}}$

By the study data, it is $(-0.09, 4.23)$

Q2.2. It's equivalent to test on $H_0: \mu_x = 0$ vs $H_1: \mu_x \neq 0$

Consider $Z = \bar{X}_n \Big/ \sqrt{\frac{S_x^2}{n}} \underset{H_0}{\sim} N(0,1)$ approximately

$\because P_{H_0}(|Z| > 1.96) = 0.05$, $Z_{obs} = 2.07 \Big/ \sqrt{\frac{121.63}{100}} \doteq 1.88$

$\Longrightarrow$ Do not reject H_0

Q2.3. (i) There appears no strong evidence against H_0 at the significance level of $\alpha = 0.05$ from either of Q2.1 and Q2.2.

(ii) $\because$ $n = 100$, the inference procedures in Q2.1 and Q2.2. don't require the normal approximation

Q2.4. Consider a testing procedure for a one-sided alternative: $H_0: \mu_U = \mu_V$ vs $H_1: \mu_U > \mu_V$