Q1

i) Since μ can be $(0, +\infty)$ we think it is two-tails

$H_0: \mu = 100$ vs $H_A: \mu \neq 100$

ii) $TS = \frac{\bar{X} - \mu}{\sigma/\sqrt{n}} \sim N(0.1) = \frac{\bar{X} - 100}{14/\sqrt{n}}$

RR: $P(|Z| > Z_{\alpha/2}) = \frac{\alpha}{2}$

iii) Since the test statistic:

$$z_{obs} = \frac{\bar{X} - 100}{14/\sqrt{n}} = \frac{82 - 100}{14/\sqrt{30}} = -7.042$$

$P(|Z_{cr}| > Z_{\alpha/2}) = \frac{\alpha}{2} \Rightarrow Z_{cr} = -1.96$

conclusion: $|Z_{obs}| > |Z_{cri}| \Rightarrow Z_{obc} \in RR$

p-value: $P(|TS| \geq |a| \,|\, H_0) = 0$

Q2:

i) $H0: \mu = 325$

$HA: \mu \neq 325$

ii) Since it is satisfied the normal distribution we say that TS is $\frac{\bar{x}-\mu}{\sigma/\sqrt{n}} \sim N(1,0)$

iii) RR : $P(|z_{obr}| > |z_{\alpha/2}|) = 0.025 \Rightarrow z_{cr} = -1.96$

$z_{obs}: \frac{304.6-325}{101.51/\sqrt{50}} = -1.42$

Conclusion: $|z_{obr}|$ vs $|z_{cr}| \Rightarrow 1.42 < 1.96$

$z_{obr} \notin RR$. Hence we say it is we do not reject H0, the μ is 325

p-value: $P(|TS| > |a| | H_0) = 0.15$