

## Question 1

a) 95% confidence interval  $\Rightarrow \alpha = 0.05 \Rightarrow \alpha/2 = 0.025$ .

$$\begin{aligned}
 (\bar{x}_1 - \bar{x}_2) \pm z_{0.025} \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} \\
 (8.4 - 11.7) \pm 1.96 \sqrt{\frac{(1.5)^2}{50} + \frac{(0.8)^2}{50}} \\
 -3.3 \pm 1.96 \sqrt{0.045 + 0.0128} \\
 -3.3 \pm 1.96 \sqrt{0.0578} \\
 -3.3 \pm 1.96 (0.2404) \\
 -3.3 \pm 0.4712 \\
 \Rightarrow [-3.77, -2.83]
 \end{aligned}$$

b) We are 95% confident that the true difference,  $\mu_1 - \mu_2$ , lies in the above interval. The manufacturer believes that  $\mu_1 - \mu_2 = -2$ . This value is *not* contained in the above interval so the manufacturer's belief is not supported by the data.

However, this is not a bad thing in this case since the confidence interval suggests that the new CPU is more than 2 seconds faster, i.e., it is better than the manufactured thought.