(a) $H_0: \mu = 11$

$H_a: \mu > 11$

(b) test statistic: $t = \dfrac{\bar{x} - \mu_0}{s_x/\sqrt{n}}$

Sample data:

12.5	11.9	13.1	13.8
13.0	10.2	13.6	14.0

$\bar{x} = 12.7625$ $\qquad \dfrac{s_{\bar{x}}}{\sqrt{n}} = 0.44.$

$s_x = 1.2455$

$\Rightarrow t^*_{df=7} = \dfrac{12.7625 - 11}{0.44} \simeq 4.$

(c) p-value: $\mathbb{P}(\bar{x} > 12.7625 \mid H_0)$

$= \mathbb{P}(t_{df=7} > 4)$

$\simeq 0.002$

$\because$ p-value is less than $\alpha = 0.05$ level, H_0 is rejected

Hence the sample data supports alternative hypothesis at the 5% level

(d) CI $= \bar{x} \pm t_{0.025,7}\, 0.44 = 12.7625 \pm 2.365(0.44)$

$= (11.723, 13.803)$