1. (b) point est. is in the middle of the interval $= \frac{1}{2}(-4.82 + 2.12) = -1.35$

(c) Since 1.8 is inside the 96% CI $(-4.82, 2.12)$, the P-value is greater than 0.04.

(d) margin of error $= \frac{1}{2}(\text{width of interval}) = \frac{1}{2}(2.12 + 4.82) = 3.47$

(e) Decreasing by factor $\left(\frac{1}{4}\right)$ is achieved by $(4)^2 n = (16)(31) = 496$

2. Option (a)

3. Option (c)

4. (b) and (c) use matched pairs methodology.

6. (a) This is an experiment, as the explanatory variable (what a subject drinks) is assigned.

(b) Let μ_c represent the mean level of interferon gamma produced in coffee drinkers, and μ_t be the mean for tea drinkers. Then our hypotheses are

$$H_0: \mu_t - \mu_c = 0 \quad \text{vs.} \quad H_a: \mu_t - \mu_c > 0.$$

(c) $$t = \frac{(\bar{x}_t - \bar{x}_c) - 0}{\sqrt{\frac{s_t^2}{n_t} + \frac{s_c^2}{n_c}}} = \frac{34.818 - 17.70}{\sqrt{\frac{21.085^2}{11} + \frac{16.694^2}{10}}} \doteq \frac{17.118}{8.263} \doteq 2.072$$

(d) $1 - \text{pt}(2.072, \text{df} = 9)$

(e) One concern is the use of normality-based methods when sample sizes are low: 10 and 11.

7. (a) $z^* = 1.880794$

(b) Take $n \geq \left[\frac{1.8808}{2(0.025)}\right]^2 = 1414.96$, so at least $n = 1415$.

(c) $\hat{p} = \frac{133}{411} \approx 0.3236$, $SE_{\hat{p}} = \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} \doteq \sqrt{\frac{(0.3236)(0.6764)}{411}} \doteq 0.02308$

So, boundaries are $0.3236 \pm (1.880794)(0.02308)$, or $(0.280, 0.367)$

8. (a) $H_0: \mu = 71$, $H_a: \mu \neq 71$

(b) $$t = \frac{\bar{x} - 71}{s/\sqrt{n}} = \frac{69.4 - 71}{11.2974/\sqrt{40}} \doteq -0.8957$$

P-value: $2 * \text{pt}(-0.8957, 39)$

(c) $\text{qt}(0.96, 39)$

(d) $\bar{x} \pm t^* SE_{\bar{x}} = 69.4 \pm (1.798)\frac{11.2974}{\sqrt{40}}$, or $(66.19, 72.61)$