1. (b) point est. is in the middle of the interval $= \frac{1}{2}(14.37 + 17.17) = 15.77$

(c) Since 17.5 is outside the 92% CI $(14.37, 17.17)$, the P-value is less than 0.08.

(d) margin of error $= \frac{1}{2}$(width of interval) $= \frac{1}{2}(17.17 - 14.37) = 1.4$

(e) Decreasing by factor $(\frac{1}{3})$ is achieved by $(3)^2 n = (9)(82) = 738$.

2. Option (d)

3. Option (d)

4. (a) 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) $z^* = 1.750686$

(b) Take $n \geq \left[\frac{1.75069}{2(0.035)}\right]^2 = 629.07$, so at least $n = 630$.

(c) $\hat{p} = \frac{91}{217} \approx 0.4194$, $SE_{\hat{p}} = \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} \doteq \sqrt{\frac{(0.4194)(0.5806)}{217}} \doteq 0.0335$

So, boundaries are $0.4194 \pm (1.750686)(0.0335)$, or $(0.361, 0.478)$

8. (a) $H_0: \mu = 72$, $H_a: \mu \neq 72$

(b)
$$t = \frac{\bar{x} - 72}{s/\sqrt{n}} = \frac{69.4 - 72}{11.2974/\sqrt{40}} \doteq -1.456$$

P-value: $2 * \text{pt}(-1.456, 39)$

(c) $\text{qt}(0.97, 39)$

(d) $\bar{x} \pm t^* SE_{\bar{x}} = 69.4 \pm (1.937)\frac{11.2974}{\sqrt{40}}$, or $(65.94, 72.86)$