Form A

2. Option (c)

3. (a) Option (i)

(b) In relation to a 92% CI, a 95% CI has a larger margin of error (when both are constructed from the same data).

(c) True, since 0 is not inside the 92% CI.

4. Option (a) displays independent samples.

5. Use formula

$$n \geq \left(\frac{z^*}{ME}\right)^2 \tilde{p}(1-\tilde{p}) = \left(\frac{1.96}{0.013}\right)^2 (0.5)^2 = 5682.84$$

Sample sizes must be integers, so a minimal size is $n = 5683$.

6. (a) $E(Y) = E(1.5X - 3) = 1.5\ E(X) - 3 = (1.5)(21) - 3 = 28.5$

(b) $Var(Y) = Var(1.5X - 3) = Var(1.5X) = (1.5)^2(2.3) = 5.175$.

7. $$E(X) = \int_{-\infty}^{\infty} x f(x)\,dx = \int_0^2 x\left(\frac{1}{3}x^2 + \frac{1}{18}x\right)dx = \int_0^2 \left(\frac{1}{3}x^3 + \frac{1}{18}x^2\right)dx$$

$$= \frac{1}{12}x^4 + \frac{1}{54}x^3 \Big|_0^2 = \frac{1}{12}\cdot 16 + \frac{1}{54}\cdot 8 = \frac{4}{3} + \frac{4}{27}$$

$$= \frac{40}{27} \doteq 1.418.$$

8. The critical value for a 90% CI for a mean with 18 dfs is

qt(0.95, 18) = 1.734.

So, our 90% CI is

$$\bar{x} \pm t^* \frac{s}{\sqrt{n}} = 31.6 \pm (1.734)\frac{3.14}{\sqrt{19}}, \quad \text{or} \quad (30.351, 32.849).$$

9. (a) When p_1 represents the proportion of 25-30 yr. olds who limit spending, and p_2 represents the proportion of 45-50 yr. olds who limit spending, our hypotheses are $H_0: p_1 - p_2 = 0$ vs. $H_a: p_1 - p_2 \neq 0$.

(b) The pooled proportion is $\hat{p} = \frac{18+22}{45+63} = \frac{40}{108} = \frac{10}{27}$.

So, our standardized test statistic is

$$z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}(1-\hat{p})\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} = \frac{18/45 - 22/63}{\sqrt{\left(\frac{10}{27}\right)\left(\frac{17}{27}\right)\left(\frac{1}{45} + \frac{1}{63}\right)}} \doteq 0.5389.$$

(c) The P-value corresponding to a 2-sided H_a comes from

$$2 * (1 - \text{pnorm}(0.5389))$$

(d) We are using a normal approximation to the sampling distribution of $\hat{p}_1 - \hat{p}_2$, and this should be done only if there are at least 10 successes and 10 failures in the two independent samples — i.e.,

$$n_1\hat{p}_1, \quad n_1(1-\hat{p}_1), \quad n_2\hat{p}_2, \quad \text{and} \quad n_2(1-\hat{p}_2)$$

are all at least 10. It is the case here, so we have no concerns.