1. Multiple choices

   (1) D The sample sizes need to be equal

   (2) B 0.10

   (3) A True

2.

   $\bar{X} \pm z_{\frac{a}{2}}(\frac{S}{\sqrt{n}})$

   $\bar{X}$ = Mean = 245.8

   a/2 = (1 – 0.95)/2 = 0.025

   $z_{\frac{a}{2}}$ = 1.96

   $\bar{X} \pm z_{\frac{a}{2}}\left(\frac{S}{\sqrt{n}}\right) = 245.8 \ \pm 1.96 * \frac{23.64}{\sqrt{15}} = \ 245.8 \ \pm 11.96$

   ⇨ **[233.84, 257.76]**

3.

   (a) $\hat{p} = \frac{864}{1234}$ = 0.70

   (b) $\hat{p} \pm z_{\frac{a}{2}}\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$

   a/2 = (1-0.95)/2 = 0.025

   $z_{\frac{a}{2}}$ = 1.96

   $\hat{p} \pm z_{\frac{a}{2}}\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = \ 0.70 \ \pm 1.96\sqrt{\frac{0.70(1-0.70)}{1234}}$

   [0.674, 0.725]

4.

$$L(\theta_1, \theta_2) = (2\pi\theta_2)^{-\frac{n}{2}} \exp\left(\frac{1}{2\theta_2}\sum_{i=1}^{n} (x_i - \theta_1)^2\right)$$

$$lnL(\theta_1, \theta_2) = -\frac{n}{2} ln2\pi\theta_2 + \frac{1}{2\theta_2}\sum_{i=1}^{n} (x_i - \theta_1)^2$$

- Take derivative of θ_1

$$\frac{d\ln L(\theta_1,\theta_2)}{d\theta_1} = \sum_{i=1}^{n} x_i - \sum_{i=1}^{n} \theta_1 = n\bar{X} - n\theta_1 = 0$$

$$\theta_1 = \bar{X}$$

- Take derivative of θ_2

$$\frac{d\ln L(\theta_1,\theta_2)}{d\theta_2} = -\frac{n}{2\theta_2} + \frac{1}{2{\theta_2}^2}\sum_{i=1}^{n} (x_i - \bar{X})^2 = 0$$

$$\frac{n}{2\theta_2} = \frac{1}{2{\theta_2}^2}\sum_{i=1}^{n} (x_i - \bar{X})^2$$

$$\theta_2 = \frac{1}{n}\sum_{i=1}^{n} (x_i - \bar{X})^2 = v$$

5.

pdf $g_4(y) = \frac{\frac{5!}{3!}\left[\frac{y^2}{4}\right]^3\left[1-\frac{y^2}{4}\right]y}{2} = 10(\frac{y^7}{64} - \frac{y^9}{256})$

mean = $\int_0^2 10y(\frac{y^7}{64} - \frac{y^9}{256}) = \frac{160}{99} = 1.616$