55. **a.** $\frac{1}{6}\overline{X}_H + \frac{5}{6}\overline{X}_L$
b. 0.68
c. No, the standard error would be 0.87.
d. No, the standard error would be 0.71.

57. $p(2.2) = 1/6$, $p(2.8) = 1/3$, $p(3.8) = 1/6$, $p(4.4) = 1/3$; $E(\overline{X}_s) = 3.4$; $\text{Var}(\overline{X}_s) = .72$

61. **a.** $w_1 + w_2 + w_3 = 0$ and $w_1 + 2w_2 + 3w_3 = 1$
b. $w_1 = -1/2$, $w_2 = 0$, $w_3 = 1/2$

Chapter 8

3. For concentration (1),
a. $\hat{\lambda} = .6825$; **b.** $.6825 \pm .081$;
c. There are not gross differences between observed and expected counts.

5. **a.** $\hat{\theta} = 1/3$ **b.** $\text{Lik}(\theta) = \theta(1-\theta)^2$
c. $\hat{\theta} = 1/3$ **d.** $\beta(2, 3)$

7. **a.** $\hat{p} = 1/\overline{X}$ **b.** $\tilde{p} = 1/\overline{X}$
c. $\text{Var}(\tilde{p}) \approx p^2(1-p)/n$
d. The posterior distribution is $\beta(2, k)$; the posterior mean is $2/(k+2)$.

13. $P(|\hat{\alpha}| > .5) \approx .1489$

17. **b.** $\hat{\alpha} = n(8\Sigma_{i=1}^n X_i^2 - 2n)^{-1} - 1/2$

c. $$\frac{\Gamma'(2\alpha)}{\Gamma(2\alpha)} - \frac{\Gamma'(\alpha)}{\Gamma(\alpha)} + \frac{1}{2n}\sum_{i=1}^{n}\log[X_i(1-X_i)] = 0$$

d. $$\left(2n\left[\frac{\Gamma''(\alpha)\Gamma(\alpha) - \Gamma'(\alpha)^2}{\Gamma(\alpha)^2} - \frac{2\Gamma''(2\alpha)\Gamma(2\alpha) - \Gamma'(2\alpha)^2}{\Gamma(2\alpha)^2}\right]\right)^{-1}$$

19. **a.** $\hat{\sigma} = \sqrt{n^{-1}\Sigma_{i=1}^n (X_i - \mu)^2}$ **b.** $\hat{\mu} = \overline{X}$ **c.** no

21. **a.** $\overline{X} - 1$ **b.** $\min(X_1, X_2, \ldots, X_n)$ **c.** $\min(X_1, X_2, \ldots, X_n)$

23. Method of moments estimate is 1775. MLE is 888.

27. Let T be the time of the first failure.
a. $\frac{5}{\tau}\exp\left(-\frac{5t}{\tau}\right)$ **b.** $\hat{\tau} = 5T$
c. $\hat{\tau} \sim \exp\left(\frac{1}{\tau}\right)$ **d.** $\sigma_{\hat{\tau}} = \tau$

31. **a.** $3p(1-p)^6$ **b.** $\hat{p} = 1/7$

33. Let q be the .95 quantile of the t distribution with $n-1$ df; $c = qs_{\overline{X}}$.

41. For α the relative efficiency is approximately .444; for λ it is approximately .823.