HW#7

5.18 **(a)** $\mu = (300)(0.21) = 63$, $\sigma = \sqrt{49.77} \doteq 7.0548$. **(b)** $np = 63$ and $n(1-p) = 237$ are both more than 10. The normal approximation gives 0.0080, or 0.0097 with the continuity correction.

5.24 **(a)** $\sigma_{\bar{x}} = \sigma/\sqrt{3} \doteq 5.7735$ mg. **(b)** Solve $\sigma/\sqrt{n} = 5$: $\sqrt{n} = 2$, so $n = 4$. The average of several measurements is more likely than a single measurement to be close to the mean.

5.30 **(a)** $P(X < 3.5) = P(Z < \frac{3.5-3.8}{0.2}) = P(Z < -1.5) = 0.0668$. **(b)** $\bar{x}$ has a $N(3.8, 0.1)$ distribution, so $P(\bar{x} < 3.5) = P(Z < \frac{3.5-3.8}{0.1}) = P(Z < -3) = 0.0013$.

5.34 **(a)** $\bar{x}$ is approximately normal with $\mu_{\bar{x}} = 2.2$ and $\sigma_{\bar{x}} = 1.4/\sqrt{52} \doteq 0.1941$ accidents. **(b)** $P(\bar{x} < 2) \doteq P(Z < -1.0302) = 0.1515$. **(c)** $P(N < 100) = P(\bar{x} < \frac{100}{52}) = P(Z < -1.4264) = 0.0769$ (table value: 0.0764). Alternatively, we might use the continuity correction and find $P(N < 99.5) = P(\bar{x} < \frac{99.5}{52}) = P(Z < -1.4759) = 0.0700$ (table value: 0.0694).

5.40 **(a)** $\bar{x}$ is normal with $\mu_{\bar{x}} = 34$ and $\sigma_{\bar{x}} = 12/\sqrt{26} \doteq 2.3534$. **(b)** $\bar{y}$ is normal with $\mu_{\bar{y}} = 37$ and $\sigma_{\bar{y}} = 11/\sqrt{24} \doteq 2.2454$. **(c)** $\bar{y} - \bar{x}$ is normal with $\mu_{\bar{y}-\bar{x}} = 37 - 34 = 3$ and $\sigma_{\bar{y}-\bar{x}} = \sqrt{\sigma_{\bar{x}}^2 + \sigma_{\bar{y}}^2} \doteq \sqrt{10.5801} \doteq 3.2527$. **(d)** $P(\bar{y} - \bar{x} \geq 4) = P(Z \geq 0.3074) = 0.3793$ (table value: 0.3783).

5.44 **(a)** $X + Y$ would be normal with $\mu_{X+Y} = 25 + 25 = 50$ and $\sigma_{X+Y} = \sqrt{181} \doteq 13.4536$. **(b)** $P(X + Y \geq 60) = P(Z \geq 0.7433) = 0.2287$ (table value: 0.2296). **(c)** The mean is correct, but the standard deviation is not.