Chapter 6, Review Problem 4: You would expect to get 36 inches give or take the SD of the first three measurements, and the SD is approximately 0.03 inches.

Details: *The average of the first three measurements is* $(35.96 + 36.01 + 36.03)/3 = 36$*, so the SD of these measurements is*

$$\sqrt{\frac{(0.04)^2 + (0.01)^2 + (0.03)^2}{3}} = 0.0294... \approx 0.03.$$

Chapter 6, Special Review Problem 14:
Moving high-risk women from the control group to the treatment group would result in a higher death rate in the treatment group and lower death rate in the control group. This would bias the study *against* the treatment — making it appear that the screening was not effective in lowering the death rate.

Chapter 13, Review problem 8: First,

$$\begin{aligned} P(\text{roll shows 3 or more spots}) &= P(\text{3 spots}) + P(\text{4 spots}) + P(\text{5 spots}) + P(\text{6 spots}) \\ &= \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} = \frac{2}{3}. \end{aligned}$$

(a) Since the rolls are independent,

$$P(\text{all } \textbf{\textit{four}} \text{ rolls show 3 or more spots}) = \frac{2}{3} \cdot \frac{2}{3} \cdot \frac{2}{3} \cdot \frac{2}{3} = \frac{16}{81}.$$

(b) $P(\text{roll does not show 3 or more spots}) = 1 - \frac{2}{3} = \frac{1}{3}$, so

$$P(\text{none of the } \textbf{\textit{four}} \text{ rolls show 3 or more spots}) = \frac{1}{3} \cdot \frac{1}{3} \cdot \frac{1}{3} \cdot \frac{1}{3} = \frac{1}{81}.$$

(c) '*Not all the rolls show 3 or more spots*' is the complement of '*all the rolls show 3 or more spots*', so

$$\begin{aligned} P(\text{not all of the } \textbf{\textit{four}} \text{ rolls show 3 or more spots}) &= 1 - P(\text{all three rolls show 3 or more spots}) \\ &= 1 - \frac{16}{81} = \frac{65}{81}. \end{aligned}$$

Chapter 14, Review problem 9:

(a) $P(A > B) = \dfrac{3}{12} = 25\%.$

(b) $P(A = B) = \dfrac{3}{12} = 25\%.$

(c) $P(A < B) = \dfrac{6}{12} = 50\%.$

Details: *There are 12 possible pairs,* $\left(\boxed{A}, \boxed{B}\right)$, *as listed below:*

$$\left(\boxed{1}, \boxed{1}\right), \left(\boxed{1}, \boxed{2}\right), \left(\boxed{1}, \boxed{3}\right), \left(\boxed{1}, \boxed{4}\right), \left(\boxed{2}, \boxed{1}\right), \left(\boxed{2}, \boxed{2}\right),$$

$$\left(\boxed{2}, \boxed{3}\right), \left(\boxed{2}, \boxed{4}\right), \left(\boxed{3}, \boxed{1}\right), \left(\boxed{3}, \boxed{2}\right), \left(\boxed{3}, \boxed{3}\right), \left(\boxed{3}, \boxed{4}\right),$$

and each pair has a chance of $\frac{1}{3} \cdot \frac{1}{4} = \frac{1}{12}$ *of being drawn, since the draws from the two boxes are independent.*
(*) Three of the pairs entail $A > B$, *so* $P(A > B) = \frac{3}{12}$.
(*) Three of the pairs entail $A = B$, *so* $P(A = B) = \frac{3}{12}$.
(*) Six of the pairs entail $A < B$, *so* $P(A < B) = \frac{6}{12}$.

Chapter 14, Review problem 11:

(a) Use the multiplication rule:

$$P(\text{all three cards are diamonds}) = \frac{13}{52} \cdot \frac{12}{51} \cdot \frac{11}{50} = \frac{1716}{132600} \approx 1.29\%$$

(b) Multiplication rule again:

$$P(\text{none of the three cards are diamonds}) = \frac{39}{52} \cdot \frac{38}{51} \cdot \frac{37}{50} = \frac{54834}{132600} \approx 41.35\%$$

(c) The event '*the cards are not all diamonds*' is the complement of the event '*all the cards are diamonds*', so

$$P(\text{the cards are not all diamonds}) = 100\% - \overbrace{P(\text{all three cards are diamonds})}^{\approx 1.29\% \text{ from (a)}} \approx 98.71\%$$

Chapter 14, Review problem 14: Both people have the same chance of winning, since they each have two *different* tickets.

Details: *To win this game, you have to match the six numbers that are selected from the box. There are*

$$\binom{53}{6} = 22,957,480$$

possible combinations of six numbers, so each individual ticket has a chance of

$$\frac{1}{22,957,480} \approx 0.0000044\%$$

to win. Different combinations are mutually exclusive, so if you have two different tickets (even if they only differ in one number) your chance of winning is approximately 0.0000088%.