1. $m = 70(0.5) + 71(0.2) + 72(0.1) + 73(0.2) = 71$

$$\sigma^2 = (70-71)^2(0.5) + (71-71)^2(0.2) + (72-71)^2(0.1) + (73-71)^2(0.2)$$
$$= 0.5 + 0 + 0.1 + 0.8$$
$$= 1.4$$

2. $\mu = -1\left(\frac{1}{8}\right) - \frac{1}{2}\left(\frac{3}{8}\right) + 0\left(\frac{1}{8}\right) + \frac{1}{2}\left(\frac{1}{8}\right) + 1\left(\frac{2}{8}\right) = 0$

$$\sigma^2 = (-1-0)^2\left(\frac{1}{8}\right) + \left(-\frac{1}{2}-0\right)^2\left(\frac{3}{8}\right) + (0-0)^2\left(\frac{1}{8}\right) + \left(\frac{1}{2}-0\right)^2\left(\frac{1}{8}\right) + (1-0)^2\left(\frac{2}{8}\right)$$
$$= \frac{1}{8} + \frac{3}{32} + 0 + \frac{1}{32} + \frac{2}{8}$$
$$= \frac{1}{2}$$

3. B

4. C

5. **a.** $\mu_A = -10(0.2) + 20(0.2) + 25(0.6) = 17$

$\mu_B = 0(0.3) + 10(0.4) + 30(0.3) = 13$

$\sigma_A^2 = (-10-17)^2(0.2) + (20-17)^2(0.2) + (25-17)^2(0.6) = 145.8 + 1.8 + 38.4 = 186$

$\sigma_B^2 = (0-13)^2(0.3) + (10-13)^2(0.4) + (30-13)^2(0.3) = 50.7 + 3.6 + 86.7 = 141$

b. Investment A

c. Investment B

6.

Golfer A		Golfer B	
Score	Frequency	Score	Frequency
39	2	40	3
40	6	41	4
41	7	42	5
42	1	43	6
43	3	44	2
44	1		

a. $\bar{X}_A = \frac{39(2) + 40(6) + 41(7) + 42(1) + 43(3) + 44(1)}{20}$

$$= \frac{820}{20}$$
$$= 41$$

$$s_A^2 = \frac{1}{19}[(39-41)^2(2) + (40-41)^2(6) + (41-41)^2(7) + (42-41)^2(1) + (43-41)^2(3) + (44-41)^2(1)]$$

$$= \frac{1}{19}[8+6+0+1+12+9]$$

$$= \frac{36}{19}$$

$$\approx 1.895$$

$$\bar{X}_B = \frac{40(3)+41(4)+42(5)+43(6)+44(2)}{20}$$

$$= \frac{840}{20}$$

$$= 42$$

$$s_B^2 = \frac{1}{19}[(40-42)^2(3)+(41-42)^2(4)+(42-42)^2(5)+(43-42)^2(6)+(44-42)^2(2)]$$

$$= \frac{1}{19}[12+4+0+6+8]$$

$$= \frac{30}{19}$$

$$\approx 1.579$$

b. Golfer A is better.

c. Golfer B is more consistent.

7. a. $\mu_A = 100(0.1)+101(0.2)+102(0.3)+103(0)+104(0)+105(0.2)+106(0.2) = 103$

$\sigma_A^2 = (100-103)^2(0.1)+(101-103)^2(0.2)+\cdots+(106-103)^2(0.2) = 4.6$

$\mu_B = 100(0)+101(0.2)+102(0)+103(0.2)+104(0.1)+105(0.2)+106(0.3) = 104$

$\sigma_B^2 = (100-104)^2(0)+(101-104)^2(0.2)+\cdots+(106-104)^2(0.3) = 3.4$

b. Business B

c. Business B

8. a.

Student A		Student B	
Grade	Relative Frequency	Grade	Relative Frequency
4	0.3	4	0.6
3	0.3	3	0.1
2	0.3	2	0
1	0.1	1	0.3

$\mu_A = 4(0.3)+3(0.3)+2(0.3)+1(0.1) = 2.8$

$\sigma_A^2 = (4-2.8)^2(0.3)+(3-2.8)^2(0.3)+(2-2.8)^2(0.3)+(1-2.8)^2(0.1) = 0.96$

$\mu_B = 4(0.6)+3(0.1)+2(0)+1(0.3) = 3$

$\sigma_B^2 = (4-3)^2(0.6)+(3-3)^2(0.1)+(2-3)^2(0)+(1-3)^2(0.3) = 1.8$

b. Student B

c. Student A

9. The number of heads is a binomial random variable X with $n = 10, p = 0.5$ so $\mu_X = 10 \times 0.5 = 5$,
$\sigma_X = \sqrt{10 \times 0.5 \times 0.5} \approx 1.581$.

10. The number of times the sum seven appears is a binomial random variable X with $n = 720$, $p = \frac{1}{6}$ so

$\mu_X = 720 \times \frac{1}{6} = 120$, $\sigma_X = \sqrt{720 \times \frac{1}{6} \times \frac{5}{6}} = 10$.

11. The number of smart thermostats is a binomial random variable X with $n = 200, p = 0.015$ so
$\mu_X = 200 \times 0.015 = 3$, $\sigma_X = \sqrt{200 \times 0.015 \times 0.985} \approx 1.719$.

12. The number of successful free throws is a binomial random variable X with $n = 20$, $p = \frac{3}{5}$ so $\mu_X = 20 \times \frac{3}{5} = 12$,

$\sigma_X = \sqrt{20 \times \frac{3}{5} \times \frac{2}{5}} \approx 2.191$.

13. **a.** $35 - c = 25$ and $35 + c = 45$ $\quad c = 10$.

$$\text{Probability} \geq 1 - \frac{5^2}{10^2} = 1 - \frac{25}{100} = .75$$

b. $35 - c = 20$ and $35 + c = 50$ $\quad c = 15$

$$\text{Probability} \geq 1 - \frac{5^2}{15^2} \approx 0.89$$

c. $35 - c = 29$ and $35 + c = 41$ $\quad c = 6$

$$\text{Probability} \geq 1 - \frac{5^2}{6^2} \approx 0.31$$

14. **a.** $8 - c = 6$ and $8 + c = 10$ $\quad c = 2$

$$\text{Probability} \geq 1 - \frac{0.4^2}{2^2} = 0.96$$

b. $8 - c = 7.2$ and $8 + c = 8.8$ $\quad c = .8$

$$\text{Probability} \geq 1 - \frac{0.4^2}{0.8^2} = 0.75$$

c. $8 - c = 7.5$ and $8 + c = 8.5$ $\quad c = .5$

$$\text{Probability} \geq 1 - \frac{0.4^2}{0.5^2} = 0.36$$

15. $\mu = 3000, \sigma = 250$

$3000 - c = 2000$ and $3000 + c = 4000$ $\quad c = 1000$

$$\text{Probability} \geq 1 - \frac{250^2}{1000^2} = 0.9375$$

Number of bulbs to replace: $\geq 5000(0.9375) \approx 4688$