1. (a) The display appears skewed.

(b) Mean \( \bar{x} = 21.07 \),

Median \( x_{[0.50]} = \frac{29.3 + 29.3}{2} = 29.3 \).

(c) B. We can see this because 50% of data is between 19.5 and 21.8 (inside the box).

2. (a) Since \( V^2 = 27S^2/49 \sim \chi^2_{27} \),

\[
P(S^2 > 90) = P(V^2 > \frac{27(90)}{49})
= P(V^2 > 49.59)
\]

From Table B, 0.005 < \( P(V^2 > 49.59) < 0.01 \).

(b) The statement is true. \( S^2 \) is centered at \( \sigma^2 \). As the sample size increases, \( S^2 \) becomes a better estimate of \( \sigma^2 \). More specifically, the distribution of \( S^2 \) becomes more tightly centered on \( \sigma^2 = 49 \), and so \( P(S > 90) \) becomes smaller.

3. (a) Since \( X \sim N(68,900) \),

\[
P(70 < X < 90)
= P(\frac{70 - 68}{\sqrt{900}} < Z < \frac{90 - 68}{\sqrt{900}})
= P(0.07 < Z < 0.73)
= P(Z > 0.07) - P(Z > 0.73)
= 0.4721 - 0.2327
= 0.2394
\]

(b) Since \( \bar{X} \sim N(68,900/12) = N(68,75) \),

\[
P(60 < X < 70)
= P(\frac{60 - 68}{\sqrt{75}} < Z < \frac{70 - 68}{\sqrt{75}})
= P(-0.92 < Z < 0.23)
= 0.4122
\]

4. (a) \( E(X) = 1 \times 0.4 + 2 \times 0.3 + 10 \times 0.3 = 4 \), and

\[
Var(X) = (1 - 4)^2 \times 0.4 + (2 - 4)^2 \times 0.3 + (10 - 4)^2 \times 0.3
= 15.6.
\]

(b) Since \( X \sim B(75,0.4) \),

\[
P(X \leq 28) \approx P(Z \leq \frac{28 - 75 \times 0.4}{\sqrt{75 \times 0.4 \times 0.6}})
= P(Z \leq -0.47)
= P(Z \geq 0.47)
= 0.3192
\]

(c) \( np = 75 \times 0.4 > 5 \) and \( n(1 - p) = 75 \times 0.6 > 5 \).

5. (a) Let \( Y \) be the number of trees that are damaged. Then \( Y \sim B(8,0.7) \), and

\[
P(Y = 6) = \frac{8!}{6!2!}(0.7)^6(0.3)^2
= 0.296.
\]

(b) Let \( X_A \) be the number of trees sampled from plantation A that are damaged. Define \( X_B \), \( X_C \), \( X_D \) similarly.

\[X = X_A + X_B + X_C + X_D,\]

and

\[
X_A \sim B(5,0.8)
X_B \sim B(12,0.75)
X_C \sim B(9,0.6)
X_D \sim B(8,0.7).
\]

Therefore,

\[
E(X) = E(X_A) + E(X_B) + E(X_C) + E(X_D)
= 5 \times 0.8 + 12 \times 0.75 + 9 \times 0.6 + 8 \times 0.7
= 24.
\]

Note: Although you can get the same conclusion using \( E(X) = \sum xp(x) \), this formula is not applicable here. Specifically, the probabilities listed in the problem (.8, .75, .6, .7) do not correspond to a single random variable \( X \) (the probabilities do not add up to 1).

Since \( X_A \), \( X_B \), \( X_C \), and \( X_D \) are independent, we have

\[
V(X) = V(X_A) + V(X_B) + V(X_C) + V(X_D)
= 5 \times 0.8 \times 0.2 + 12 \times 0.75 \times 0.25
+ 9 \times 0.6 \times 0.4 + 8 \times 0.7 \times 0.3
= 6.89.
\]

Grade Distribution

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<tr>
<td>100-109.9</td>
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<td>90-99.9</td>
<td>59</td>
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<td>80-89.9</td>
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<td>70-79.9</td>
<td>21</td>
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<tr>
<td>60-69.9</td>
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<tr>
<td>50-59.9</td>
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<td>3</td>
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mean = 85.95, median = 90