Find \( P(X > 60) \)

\[
P(X > 60) = P(Z > 2.00)
\]

\[
Z = \frac{X - \mu}{\sigma} = \frac{60 - 44}{8} = 2.00
\]

\[
1 - P(Z \leq 2.00) = 1 - .9772 = 0.0228
\]
\[ P(50 \leq X \leq 60) \]

\[ = P(0.75 < Z < 2.00) \]

\[ = P(Z \leq 2.00) - P(Z \leq 0.75) \]

\[ = 0.9772 - 0.7734 \]

\[ = 0.2038 \]
\[ P(50 \leq X \leq 60) \]
\[ = P(0.75 < Z < 2.00) \]
\[ = P(Z < 2.00) - P(Z < 0.75) \]
\[ = 0.9772 - 0.7734 \]
\[ = 0.2038 \]
\[ P(X \leq 40) \]

\[ = P(Z \leq -0.50) \]

\[ z = \frac{x - \mu}{\sigma} \]

\[ = \frac{40 - 44}{8} \]

\[ = -0.50 \]

= .3085
Normal Approximation of the Binomial Dist.

We can use the normal dist. to approx. binomial probs if:

1) \( np > 5 \)
2) \( n(1-p) > 5 \)

Note: Since the Normal Dist. is cont., but the binomial dist. is discrete, we must use the "continuity correction"
Binomial

$P(X \leq 3) \approx P(Y \leq 3)$

Normal w/o cont. correction

Normal with cont. correction

$\approx P(Y \leq 3.5)$
**Ex:** Suppose \( n = 100 \) and \( p = .6 \) in a binomial exp.
Find \( P(x \leq 70) \)

**Note:** Binomial Table does not have \( n = 100 \)

Can we use the Normal Approx?
Check \( np = 100(.6) \)
\[
= 60 \quad > \quad 5
\]

and \( n(1-p) = 100 (1-.6) \)
\[
= 100 (.4)
= 40 \quad > \quad 5
\]

Yes!
First we need

\[ \mu = np = 100 \times 0.6 = 60 \]

and

\[ \sigma = \sqrt{np(1-p)} = \sqrt{100 \times 0.6 \times (1-0.6)} = \sqrt{24} = 4.899 \]

Now consider

\[ P(x \leq 70) \approx P(x \leq 70.5) \]

**binomial (discrete)** \hspace{1cm} **Normal (with cont. corr.) (continuous)**

\[ = P(z \leq 2.14) \]

**Standard Normal**

\[ z = \frac{x - \mu}{\sigma} = \frac{70.5 - 60}{4.899} \]

\[ = 2.14 \]
\[ = 0.9838 \]

EX: Text Example 6.20