6.3 Working with Normally Distributed Variables

Ex. Each year, thousands of college seniors take the Graduate Record Examination (GRE). The scores are transformed so that they have a mean of 500 and a SD of 100. Furthermore, the scores are known to be normally dist'ed. Determine the percentage of students that score:

a. between 350 and 600 inclusive.

Step 1 & 2:

\[ \mu = \text{ and } \sigma = \]

Step 3:

\[ P(350 \leq X \leq 600) = ? \text{ (Shaded area).} \]

To use Normal tables, first transform the normal RV X into the standard normal RV Z (find z-scores):

\[ \frac{350 - \mu}{\sigma} \leq \frac{X - \mu}{\sigma} \leq \frac{600 - \mu}{\sigma} \]

or
Step 4:

\[ P(350 \leq X \leq 600) = P(-1.5 \leq Z \leq 1) \]

Represents the area under \( N(0,1) \) over the interval from -1.5 to 1.

b. 375 or greater.

\[ P(X \geq 375) = P\left( Z \geq \right) \]

c. between 300 and 450.
d. exactly equal to 680.

\[ P(X = 680) = \]

e. What score is exceeded by exactly 5%? (95 percentile).

\[ P(Z < a) = 0.95 \rightarrow a = \]

\[ \text{Excel:} \]

\[ x = \]

\[ = \]

\[ = \]