A continuous rv \( X \) has a **normal distribution** with mean \( m \) and variance \( \sigma^2 \) if \( X = m + \sigma Z \) where \( Z \) is standard.

Hence, the probability distribution for \( X \) is bell shaped with its peak directly above \( x = m \) and inflection points directly above \( x = m - \sigma \) and \( x = m + \sigma \).

Also \( P \left( a < X < b \right) = P \left( a < m + \sigma Z < b \right) \)

\[
= P \left( \frac{a - m}{\sigma} < Z < \frac{b - m}{\sigma} \right)
\]

Since \( E(Z) = 0 \) and \( V(Z) = 1 \), we see immediately that \( E(X) = m \) and \( V(X) = \sigma^2 \).