If \( X_1, X_2, \ldots, X_n \) are independent Normal random variables, we already observed that the sum \( X_1 + X_2 + \ldots + X_n \) is a Normal random variable too. So

\[
\frac{X_1 + X_2 + \ldots + X_n - (\mu_1 + \mu_2 + \ldots + \mu_n)}{\sqrt{\sigma_1^2 + \sigma_2^2 + \ldots + \sigma_n^2}}
\]

is a standard Normal random variable, i.e. has 0 mean and variance of 1.

If \( X_1, X_2, \ldots, X_n \) are independent Normal random variables that have the same mean \( \mu \) and the same variance \( \sigma^2 \), then

\[
\frac{X_1 + \ldots + X_n - n\mu}{\sqrt{n\sigma^2}}
\]

is a standard Normal random variable.