Example: Say $X_1, X_2, \ldots, X_{100}$ are independent Normal random variables, each with mean 3 and variance 5.

Find the probability that the sum of the X_j's does not exceed 313.

$$P\left(X_1 + X_2 + \cdots + X_{100} \leq 313\right)$$

$$= P\left(\frac{X_1 + X_2 + \cdots + X_{100} - (100)(3)}{\sqrt{100(5)}} \leq \frac{313 - (100)(3)}{\sqrt{100(5)}}\right)$$

$$= P\left(Z \leq 0.58\right) \qquad \text{where } Z \text{ is a standard normal random variable}$$

$$= F_Z(0.58)$$

$$= 0.7190$$