Example. Suppose $X_1, X_2, \ldots, X_{150}$ each have expected value 3.5 and variance 1.2. Find a threshold "a" so that

$$P(X_1 + X_2 + \ldots + X_{150} \leq a) = 0.90$$

i.e. want a value "a" so that we are 90% sure the sum of the $X_j$'s is less than or equal to "a".

$$0.90 = P(X_1 + \ldots + X_{150} \leq a) = P\left(\frac{X_1 + \ldots + X_{150} - (150)(3.5)}{\sqrt{150}(1.2)} \leq \frac{a - (150)(3.5)}{\sqrt{150}(1.2)}\right)$$

$$= P\left(Z \leq \frac{a - (150)(3.5)}{\sqrt{150}(1.2)}\right)$$

$$= F_Z\left(\frac{a - (150)(3.5)}{\sqrt{150}(1.2)}\right)$$

$\uparrow$ know this input to the CDF should be about 1.28

$$F_Z(1.28) = 0.8997$$

Need "a" to satisfy

$$\frac{a - (150)(3.5)}{\sqrt{150}(1.2)} = 1.28$$

$$a = 1.28 \sqrt{150(1.2)} + (150)(3.5) = 542.17$$

So we are 90% sure that $X_1 + \ldots + X_{150}$ is less than 542.17.