Anti-Quiz # 5

In some company, 60% of confidential email messages are not properly encrypted. At the end of the fiscal year, 90 managers in this company e-mail their financial reports to the executive officer. What is the probability that at least 50 of these reports are not properly encrypted?

Solution.
This problem is similar to Practice problems 7–8.

Let $X$ be the number of non-encrypted reports. This is a number of “successes” in $n = 90$ Bernoulli trials. Therefore, the distribution of $X$ is

$$\text{Binomial}(n = 90, p = 0.6) \approx \text{Normal}(\mu, \sigma),$$

where $\mu = np = 54$ and $\sigma = \sqrt{np(1 - p)} = 4.65$. Using the continuity correction,

$$P(X \geq 50) = P(X \geq 49.5) = P \left( \frac{X - \mu}{\sigma} > \frac{49.5 - 54}{4.65} \right) = P(Z > -0.97) = P(Z < 0.97) = 0.8340$$

according to the Table of Standard Normal distribution.

In some company, 90% of confidential email messages are not properly encrypted. At the end of the fiscal year, 60 managers in this company e-mail their financial reports to the executive officer. What is the probability that at least 50 of these reports are not properly encrypted?

Solution.
This problem is similar to Practice problems 7–8.

Let $X$ be the number of non-encrypted reports. This is a number of “successes” in $n = 60$ Bernoulli trials. Therefore, the distribution of $X$ is

$$\text{Binomial}(n = 60, p = 0.9) \approx \text{Normal}(\mu, \sigma),$$

where $\mu = np = 54$ and $\sigma = \sqrt{np(1 - p)} = 2.32$. Using the continuity correction,

$$P(X \geq 50) = P(X \geq 49.5) = P \left( \frac{X - \mu}{\sigma} > \frac{49.5 - 54}{2.32} \right) = P(Z > -1.94) = P(Z < 1.94) = 0.9738$$

according to the Table of Standard Normal distribution.