Assignment 1 (15 points)

We want to estimate the underlying probability (Θ^*) that a coin falls with head up within ϵ by tossing the coin n times. The probability that the estimate (θ) is out of the bound ϵ (i.e., $P(|\theta - \theta^*| \geq \varepsilon)$, also called the failure probability) is related to both n and ε according to the formula $P(|\theta - \theta^*| \geq \varepsilon) \leq 2e^{-2n\varepsilon^2}$.

(1) Given the relation above, assuming we want the probability that estimate (θ) is within ϵ is at least $1 - \delta$ (i.e., $P(|\theta - \theta^*| < \varepsilon) \geq 1 - \delta$), please prove that the number (n) of flips of the coin must satisfy the following inequality (10 points).

$$n \geq \frac{\ln(2/\delta)}{2\epsilon^2}$$

(2) If $\epsilon = 0.1$ and $\delta = 0.05$, which is the minimum n that meets the requirement (5 points)