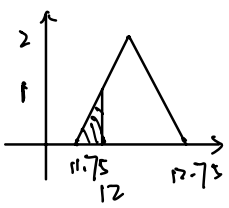
Homework 1.

Problem 2:



$$P(X<12) = \frac{0.25 \cdot 1}{2} = \frac{1}{8}$$

Problem 3:

(1). We got: $\bar{X} = 0.5046$ $n=25$, $Z_{0.025} = \Phi(-0.975) = 1.96$, $\sigma = 0.0001$, $\mu = 0.5025$

$H_0: \mu = 0.5025$ $H_1: \mu \neq 0.5025$

Test Statistic: $Z_0 = \frac{\bar{X} - \mu}{\sigma/\sqrt{n}} = \frac{0.5046 - 0.5025}{0.0001/\sqrt{25}} = 105$

Rejection Region $|Z_0| > Z_{\alpha/2} = 1.96$

So it is rejected.

(2) p-value $= 2[1 - \Phi(|\frac{\bar{X} - \mu_0}{\sigma/\sqrt{n}}|)] = 2[1 - \Phi(105)] \approx 0$.

(3). Confidence Interval

$\bar{X} - Z_{\alpha/2}\frac{\sigma}{\sqrt{n}} \leq \mu \leq \bar{X} + Z_{\alpha/2}\frac{\sigma}{\sqrt{n}}$

$0.5046 - 1.96 \cdot \frac{0.0001}{5} \leq \mu \leq 0.5046 + 1.96 \cdot \frac{0.0001}{5}$

$\Rightarrow CI = [0.5045608, 0.5046392]$