Take Home Assignment 6

Hypothesis Testing (I)

Brendan Doncaster

N9819363

Spam Filters*

(a)

B. This is a Type II error because H_0 is false, but the filter failed to reject it.

(b)

C. This is a Type I error because H_0 is true, and the filter rejected it.

(c)

A. Decreased Type I error, increased Type II error.

(d)

B. A lower α, because it takes stronger evidence to classify the e-mail as spam.

Lightbulbs

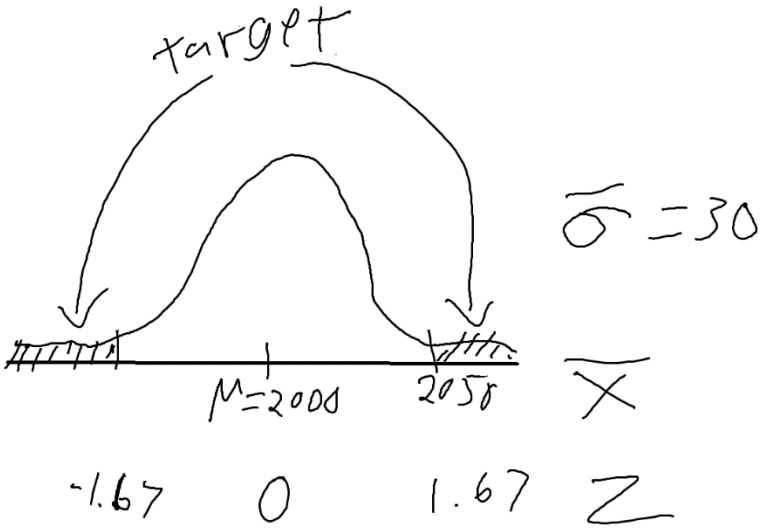
$$X\colon\ \mu = 2000, \sigma = 120, \alpha = 5\%$$

$$H_0\colon \mu = 2000$$
$$H_1\colon \mu \neq 2000$$

$$p - value\ approach$$
$$pvalue < \ \alpha \rightarrow reject\ H_0$$
$$pvalue > \ \alpha \rightarrow accept\ H_0$$

$$\bar{X}\colon \mu_{\bar{X}} = \mu = 2000,\ \sigma_{\bar{X}} = \frac{\sigma}{\sqrt{n}} = \frac{120}{\sqrt{16}} = \frac{120}{4} = 30$$

$$Z = \frac{\bar{x} - \mu_{\bar{X}}}{\sigma_{\bar{X}}}$$
$$Z = \frac{2050 - 2000}{30}$$
$$Z = \frac{50}{30} = 1.6666° = 1.67$$



$$pvalue = 2 * P(\overline{X} > 2050)$$
$$pvalue = 2 * P(Z > 1.67)$$
$$pvalue = 2 * [0.5 - P(0 < Z < 1.67)]$$
$$pvalue = 2 * (0.5 - 0.4525)$$
$$pvalue = 0.095$$
$$pvalue = 9.5\%$$

$$pvalue > \ \alpha \rightarrow accept\ H_0$$

Therefore, there is sufficient evidence that the average lifetime of Fillips lightbulbs is not different from the past.