mean and standard deviation for a sample mean ($\bar{x}$)

$\mu_{\bar{x}} = \mu$

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$

mean and standard deviation for sample proportion ($\hat{p}$)

$\mu_{\hat{p}} = \hat{p}$

$\sigma_{\hat{p}} = \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$

4.2

Confendence interval → for sample mean

$\left(\bar{x} - z_{1-\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}}, \bar{x} + z_{1-\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}}\right) = (\bar{x} - \delta\mu, \bar{x} + \delta\mu)$

marginal error

$\delta\mu = \pm z_{1-\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}}$

$n = \left(\frac{\sigma z_{1-\alpha/2}}{\delta M}\right)^2$

4.3

Confidence interval → for proportion

$\left(\hat{p} - z_{1-\frac{\alpha}{2}} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}, \hat{p} + z_{1-\frac{\alpha}{2}} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}\right)$

$(\hat{p} - \delta p, \hat{p} + \delta p)$

marginal error

$\delta p = \pm z_{1-\frac{\alpha}{2}} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$

$n = \left(\frac{z_{1-\alpha/2}}{\delta p}\right)^2 \hat{p}(1-\hat{p})$ & $n = \left(\frac{z_{1-\alpha/2}}{L}\right)^2$

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4.4 · 4.5

Hypothesis

1 null hypothesis H_0, alternate hypothesis H_1 with Sample mean $\bar{x}$

$H_0: \mu = \mu_0$ Versus H_1: $\mu \neq \mu_0$, $\mu > \mu_0$ at least more than, $\mu < \mu_0$ less than at most

2 test statistic

$$Z_0 = \frac{\bar{x} - \mu_0}{\frac{\sigma}{\sqrt{n}}}$$

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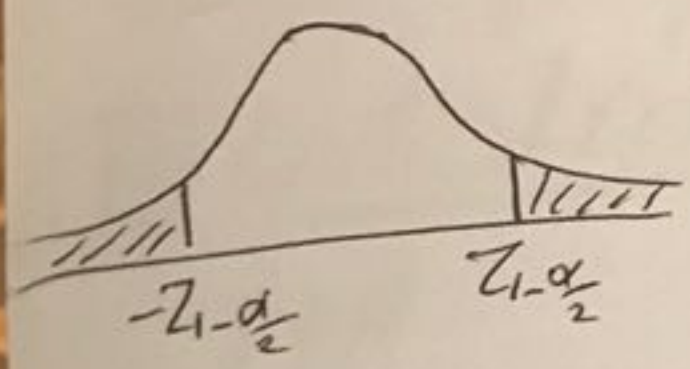
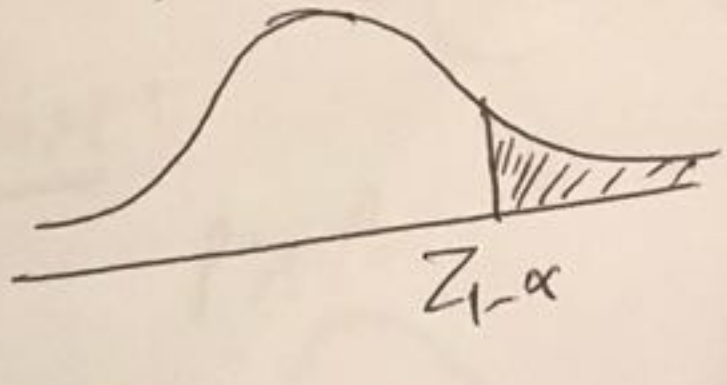
3 critical region

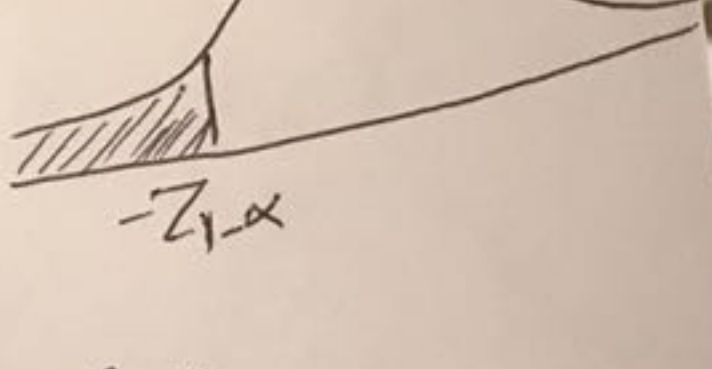
$\mu \neq \mu_0$



$\mu > \mu_0$



$\mu < \mu_0$



4 Decision

* Z_0 falls in critical region we rejected H_0
* Z_0 not falls in critical region we accepted H_0

5 P-value

P-value $= 2P(Z > |Z_0|)$ $\mu \neq \mu_0$

P-value $= P(Z > Z_0)$ $\mu > \mu_0$

P-value $= P(Z < -|Z_0|)$ $\mu < \mu_0$

P-value $< \alpha \rightarrow$ rejected H_0, P-value $> \alpha$ we accepted H_0

4.6

Hypothesis with Sample proportion (3)

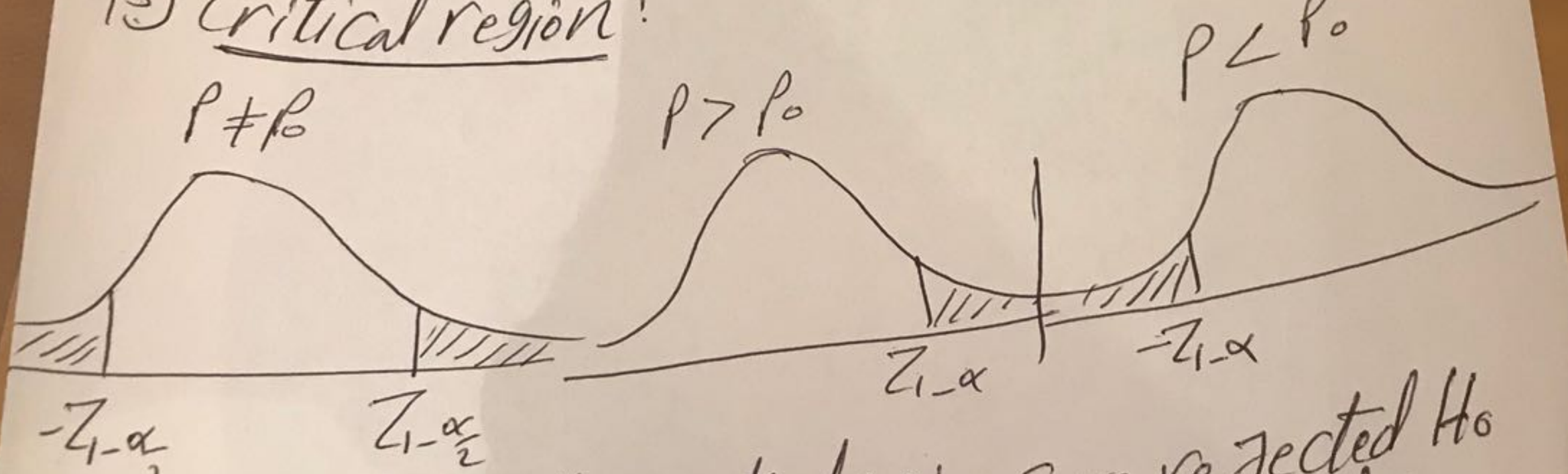
① null hypothesis H_0, alternate hypothesis H_1

$H_0: \hat{P} = P_0$ versus H_1 ⟵ $P \neq P_0$, $P > P_0$, $P < P_0$

② test statistic Z_0

$$Z_0 = \frac{\hat{P} - P_0}{\sqrt{\frac{P_0(1-P_0)}{n}}}$$

③ critical region:



④ Decision Z_0 falls in critical region So we rejected H_0

Z_0 not falls in critical region So we accepted H_0

⑤ P-value ⟵

$P \neq P_0$: $2P(Z > |Z_0|)$

$P > P_0$: $P(Z > Z_0)$

$P < P_0$: $P(Z < -|Z_0|)$