Question 2.1

b i) IS MEAN SIGNIFICANT?

$H_0 : E(X) = 0$

$H_1 : E(X) \neq 0$

→ t_test

RULE:

IF $|\bar{X}| > 2\frac{SD}{\sqrt{n}}$ → REJECT H_0

IF $|\bar{X}| \leq 2\frac{SD}{\sqrt{n}}$ → FAIL TO REJECT H_0

t_statistic: $\frac{\hat{\beta} - \beta_{H0}}{SE(\hat{\beta})}$

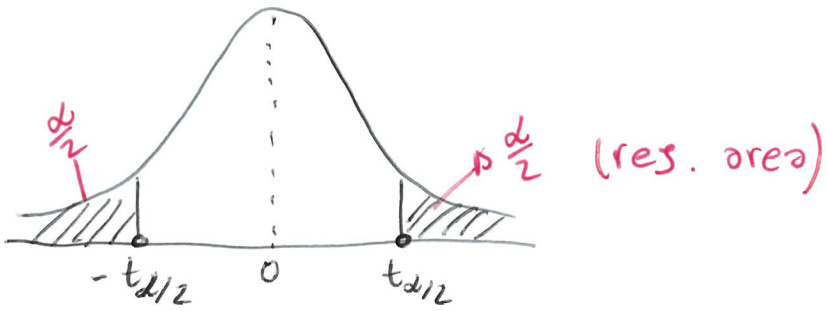
→ SAMPLE MEAN

ESTIMATED VALUE OF MEAN

In our case:

$$t = \frac{\bar{X} - \mu_{H0}}{\frac{SD}{\sqrt{n}}}$$

$\frac{SD}{\sqrt{n}} \sim SE$ → SAMPLE STANDARD DEVIATION (s or $\hat{\sigma}$)



REJECTION RULE:

IF $|t\_stat| > t_{\alpha/2}$ → reject H_0

IF $\alpha = 5\%$

IF $|t\_stat| > 1.96 \sim 2$ reject H_0

$$\left| \frac{\bar{X} - 0}{SD/\sqrt{n}} \right| > 2$$

$$|\bar{X}| > 2\frac{SD}{\sqrt{n}}$$

general rejection rule

WE KNOW: $\bar{X} = 0.000402$

$SD = 0.016927$

$n = 9843$

$$2\frac{SD}{\sqrt{n}} = 2 \cdot \frac{0.016927}{\sqrt{9843}} = 0.00034$$

SINCE $\bar{X} = 0.000402 > 0.00034$ → reject H_0

↓

mean is statistically significant

11) IS SKEWNESS EQUAL TO ZERO?

$$t\_stat = \frac{\hat{S}(x)}{6/\sqrt{n}} =$$

$$= \frac{0.061387}{6/\sqrt{9843}} = 2.4864$$

reg rule: IF $|t| > 2 \rightarrow$ reject H_0

$2.4864 > 2 \rightarrow$ reject H_0

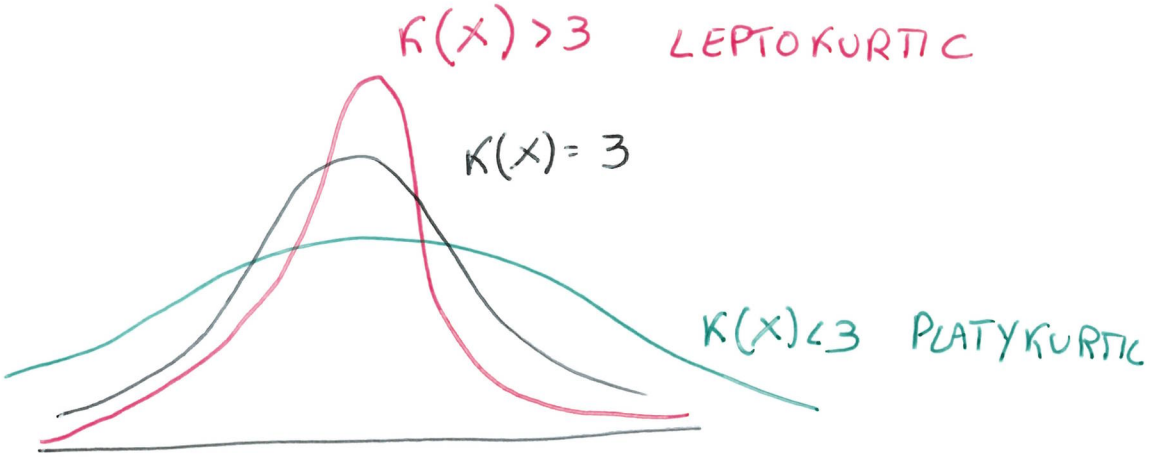
↓

SKEWNESS IS NOT STATISTICALLY EQUAL TO ZERO

↓

POSITIVE SKEW

iii) IS EXCESS KURTOSIS EQUAL TO ZERO?



EXCESS KURTOSIS : $K(X) - 3$

$$t\text{-stat}: \frac{\hat{K}(X) - 3}{\sqrt{24/n}}$$

$H_0: K(X) - 3 = 0$

$H_1: K(X) - 3 \neq 0$

or

$H_0: K(X) = 3$

$H_1: K(X) \neq 3$

$$t = \frac{12.91636 - 3}{\sqrt{24/9843}} = 200.6928$$

SINCE $200.6928 > 2$ → LEPTOKURTIC DISTRIBUTION

$|t\text{-stat}| > 1.96 \approx 2$

IV)

$$JB = \frac{S^2(x)}{\frac{6}{\sqrt{n}}} + \frac{(K(x)-3)^2}{\frac{24}{\sqrt{n}}}$$

↓

TEST FOR NORMALITY

H_0: RETURNS ARE NORMALLY DISTRIBUTED

H_1: RETURNS ARE NOT NORMALLY DISTRIB.

↓

H_0: $JB = 0$ ⟶ H_0: $S(x) = 0$ AND $K(x) = 3$

H_1: $JB \neq 0$