CIMT Further Statistics – p38 Example

THIS SOLUTION DOES NOT ASSUME PARENT POPULATION STANDARD DEVIATION IS KNOWN.

X = percentage fat content

Sample mean, $\bar{x} = \frac{228}{12} = 19$

sample st. dev, $s_{n-1} = \sqrt{\dfrac{4448 - \frac{228^2}{12}}{11}} = \sqrt{10.545} \approx 3.25$

we shall assume X to be normally distributed

$X \sim N(\mu, \sigma^2)$

$H_0: \mu = 20$

$H_1: \mu < 20$

Assume H_0 to be true

$\alpha = 5\%$ one tail test

so $X \sim N(20, \sigma^2)$

$\bar{X}$ = mean percentage fat content, sample size 12.

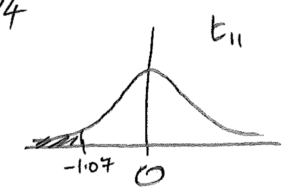
$\bar{X} \sim N(20, \frac{\sigma^2}{12})$

$\dfrac{\bar{X} - 20}{\sqrt{\frac{\sigma^2}{12}}} \sim N(0, 1^2)$

now we shall estimate σ with s_{n-1} $\Rightarrow$ no longer $N(0,1^2)$ but rather t_{11} distribution

so $\dfrac{\bar{X} - 20}{\sqrt{\frac{s^2}{12}}} \sim t_{11}$

so test statistic, $t = \dfrac{\bar{x} - 20}{\sqrt{\frac{3.25^2}{12}}} = \dfrac{19 - 20}{\sqrt{\frac{3.25^2}{12}}} = -1.06674$



p-value $= P(t_{11} < -1.07)$

$= 0.154472$

> 0.05

So we have no evidence to reject H_0 and so the mean percentage fat content is 20%. This means that the manufacturer's claim is not supported by this study