Example

Example 2.1 Daily intake of energy (kJ) for 11 women :

5260 5470 5640 6180 6390 6515 6805 7515 7515 8230 8770

- Make a 95% for the mean daily energy intake (kJ) of the population of women ...
- Test the hypothesis that the mean is equal to the recommended value (7725 kJ) ...

(a) $\bar{x} = 6753.64$

$s = 1142.12$

$n = 11$

$\Rightarrow t_{10,\,0.975} = 2.228$ ($10 = 11-1$)

$\Rightarrow \bar{x} \pm 2.228 \times s/\sqrt{n}$

$\Rightarrow 6753.64 \pm 2.228 \times 1142.12/\sqrt{11}$

$\Rightarrow [5986.4, 7520.9]$

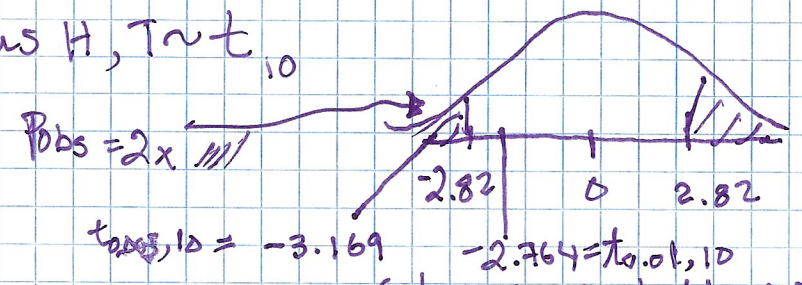
(b) 1. par μ = moyenne de la prise quotidienne

2. H: $\mu = 7725$

A: $\mu \neq 7725$

3. $T = \dfrac{\bar{x} - \mu_H}{s/\sqrt{n}}$; $t_{obs} = \dfrac{6753.64 - 7725}{1142.12/\sqrt{11}} = -2.82$

4. Sous H, $T \sim t_{10}$



$\Rightarrow 0.01 < p_{obs} < 0.02$ (d'après la table t)

5. Si $\alpha = 0,01$, on NE REJETTE PAS H

Pour $\alpha > 0.02$, on REJETTE H

Ex. 92

1. par $\mu_{mince} - \mu_{obèse}$ = différences des dépenses d'énergie entre les femmes minces et obèses

2. H: $\mu_{mince} - \mu_{obèse} = 0$

A: $\mu_{mince} - \mu_{obèse} \neq 0$

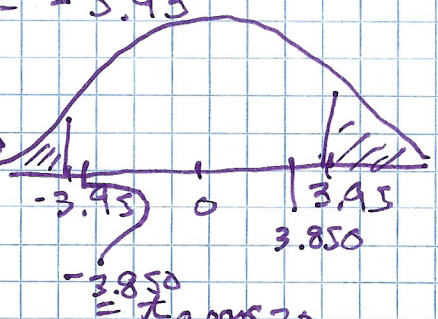
3. $T = \dfrac{\hat{\mu}_{mince} - \hat{\mu}_{obèse} \ (-0)}{\sqrt{s_p^2 (n_m + n_o)/(n_m \cdot n_o)}}$, en supposant que les variances sont égales: $\sigma_\mu^2 = \sigma_o^2$

et $s_p^2 = ((n_m - 1)s_m^2 + (n_o - 1)s_o^2)/(n_m + n_o - 2)$;

$s_p^2 = (12 \cdot 1.53 + 8 \cdot 1.95)/(13 + 9 - 2) = 1.70$

$\Rightarrow t_{obs} = \dfrac{8.07 - 10.3}{\sqrt{1.7(13+9)/(13 \cdot 9)}} = -3.95$

4. Sous H, $T \sim t_{20}$



$\Rightarrow$ Pobs < 0.001

5. Pour les valeurs α typiques, on REJETTE l'hypothèse nulle H que les moyennes sont égales

9.1 (encore)

Test

1. parameter: population mean difference $\mu_{post} - \mu_{pre}$
2. H: $\mu_{post} - \mu_{pre} = 0$
   A: $\mu_{post} - \mu_{pre} \neq 0$
3. differences post - pre: $-1350; -1250; -1755; -1020; -745; -1835$
   $-1540; -1540; -725; -1330; -1435$

   $\bar{d} = -1320.455$ $\quad s_d = 366.7435$

   $t_{ap-obs} = \dfrac{\bar{d} - 0}{s_d / \sqrt{n}} = \dfrac{-1320.455}{366.7435/\sqrt{11}} = -11.94$
4. $|11.94| >> 4.587$

   $\Rightarrow p_{obs} << 0.001$
5. REJECT H; highly significantly different

[WRONG to treat as 2 independent samples: $t = 2.62$, $df = 20$, $p = 0.016$
$\Rightarrow$ much less significant]