Two-sample t-test

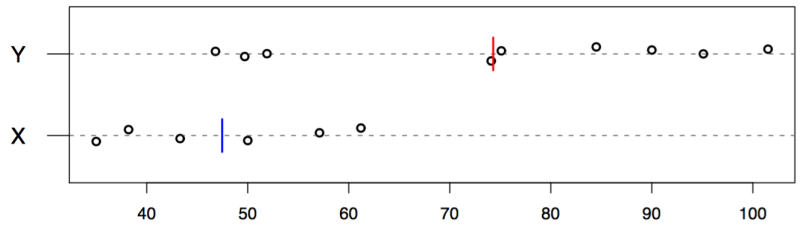
$X_1, \ldots, X_n$ iid Normal(μ_A, σ) $\qquad$ $Y_1, \ldots, Y_m$ iid Normal(μ_B, σ)

Test $H_0 : \mu_A = \mu_B$ vs $H_a : \mu_A \neq \mu_B$

Test statistic: $T = \dfrac{\overline{X} - \overline{Y}}{s_p \sqrt{\frac{1}{n} + \frac{1}{m}}}$ where $s_p = \sqrt{\dfrac{s_A^2(n-1) + s_B^2(m-1)}{n+m-2}}$

$\longrightarrow$ Compare to the t distribution with n + m – 2 d.f.

Two-sample t-test

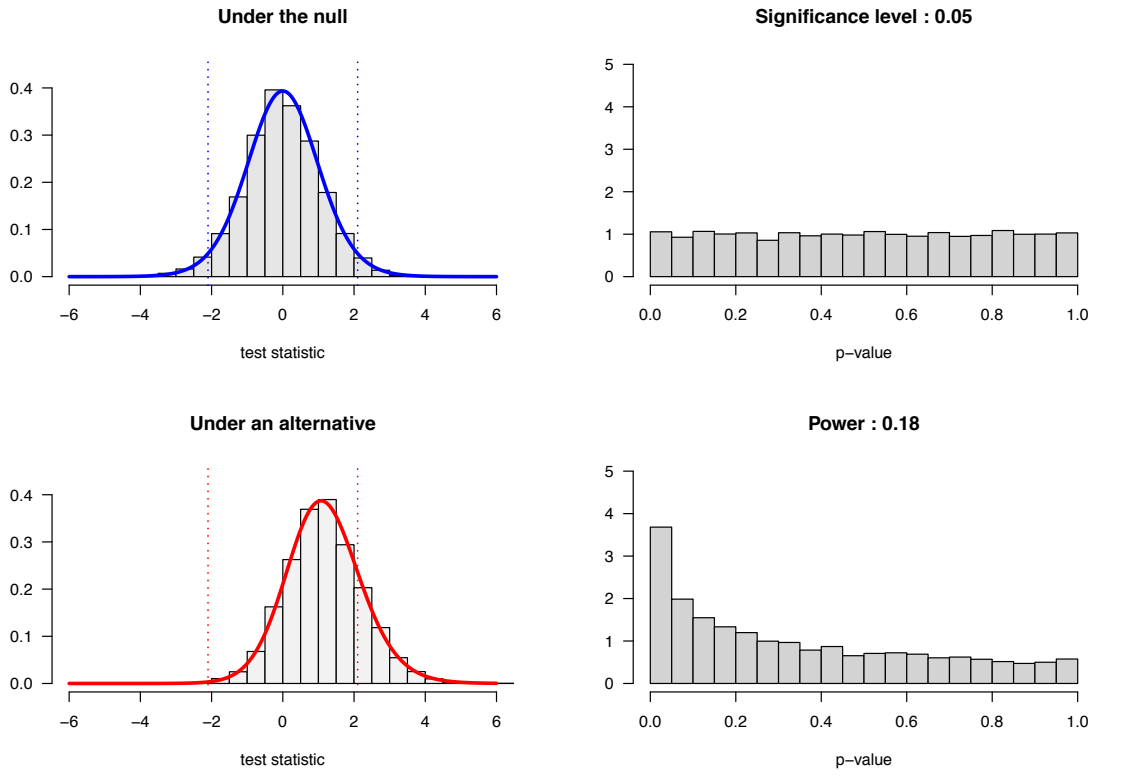


$\overline{X}$ = 47.5 $\quad$ s_A = 10.5 $\quad$ n = 6

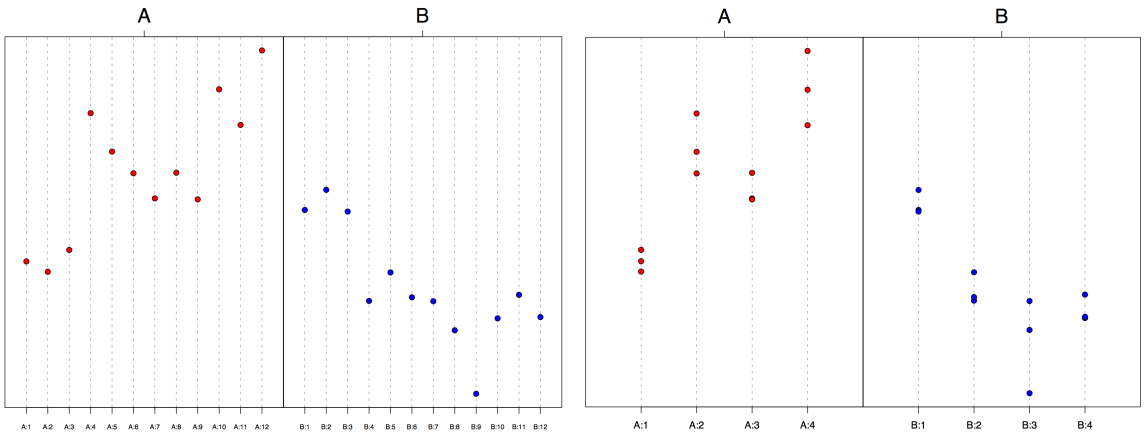
$\overline{Y}$ = 74.3 $\quad$ s_B = 20.6 $\quad$ m = 9

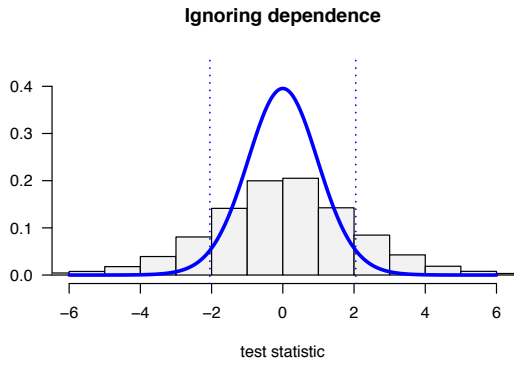
s_p = 17.4 $\quad$ T = –2.93

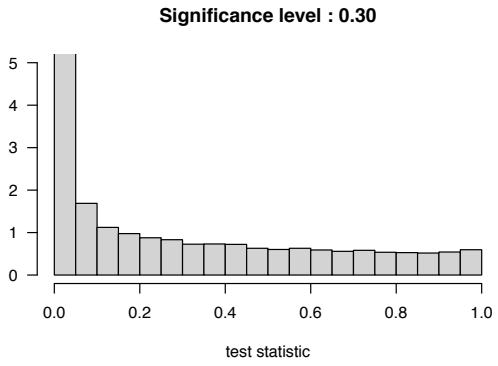
$\longrightarrow$ P = `2*pt(-2.93,6+9-2)` = 0.011.

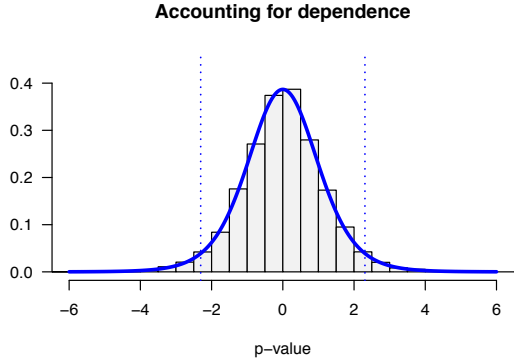


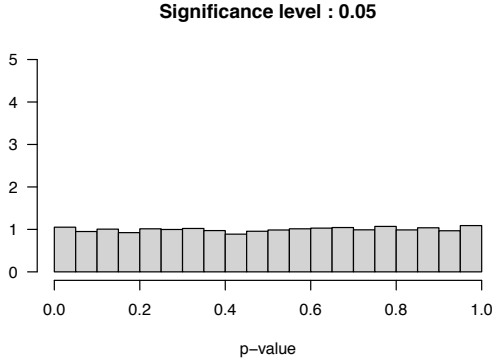
Technical replicates



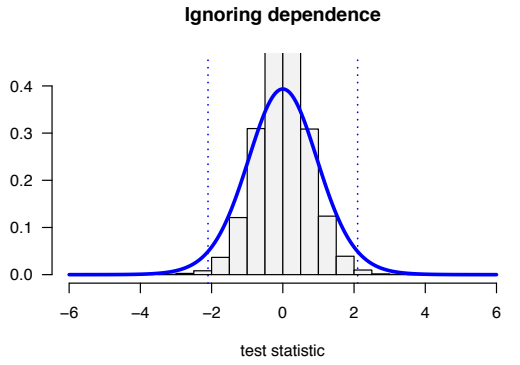


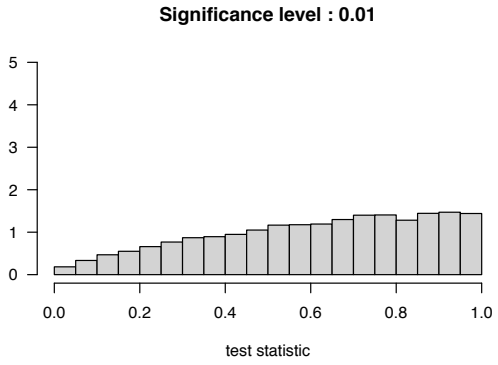


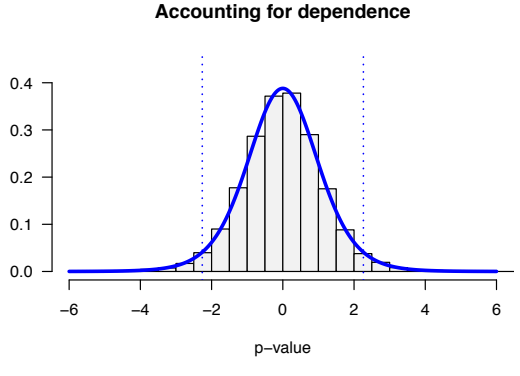


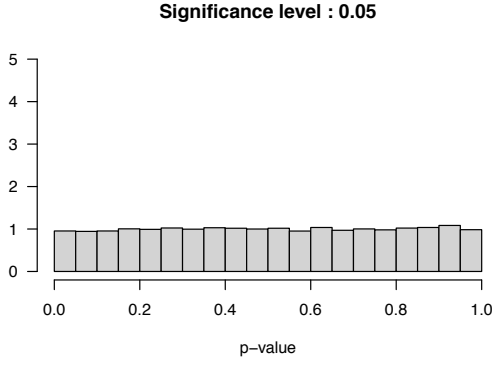


5 biological replicates per group, with 3 technical replicates each.
Biological variability (SD) ten times larger than technical variability.

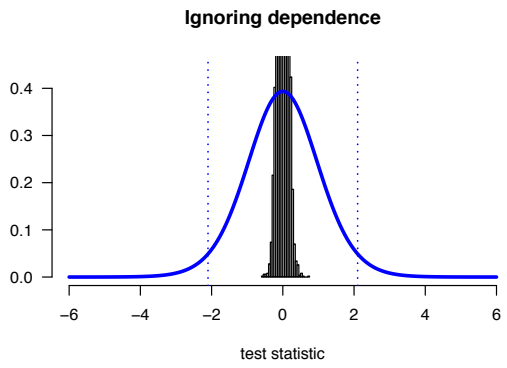


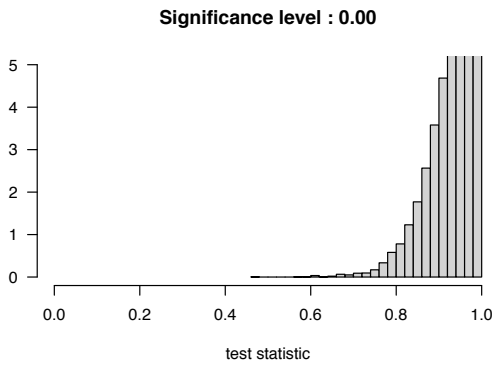


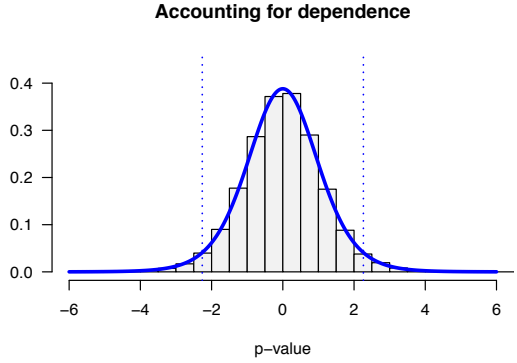


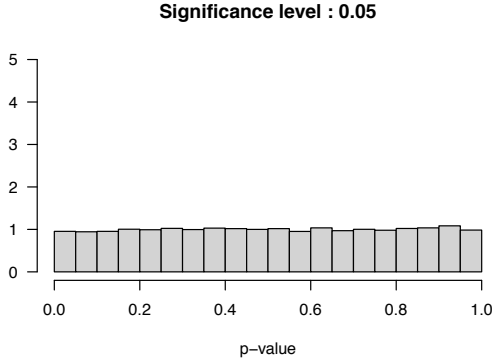


Paired data in ten observations.
Between subject variability (SD) equal to error.









Paired data in ten observations.
Between subject variability (SD) ten times larger than error.