Math 362: Mathematical Statistics II

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Chapter 9. Two-Sample Inferences

§ 9.1 Introduction

§ 9.2 Testing $H_0 : \mu_X = \mu_Y$

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§ 9.4 Binomial Data: Testing $H_0 : p_X = p_Y$

§ 9.5 Confidence Intervals for the Two-Sample Problem

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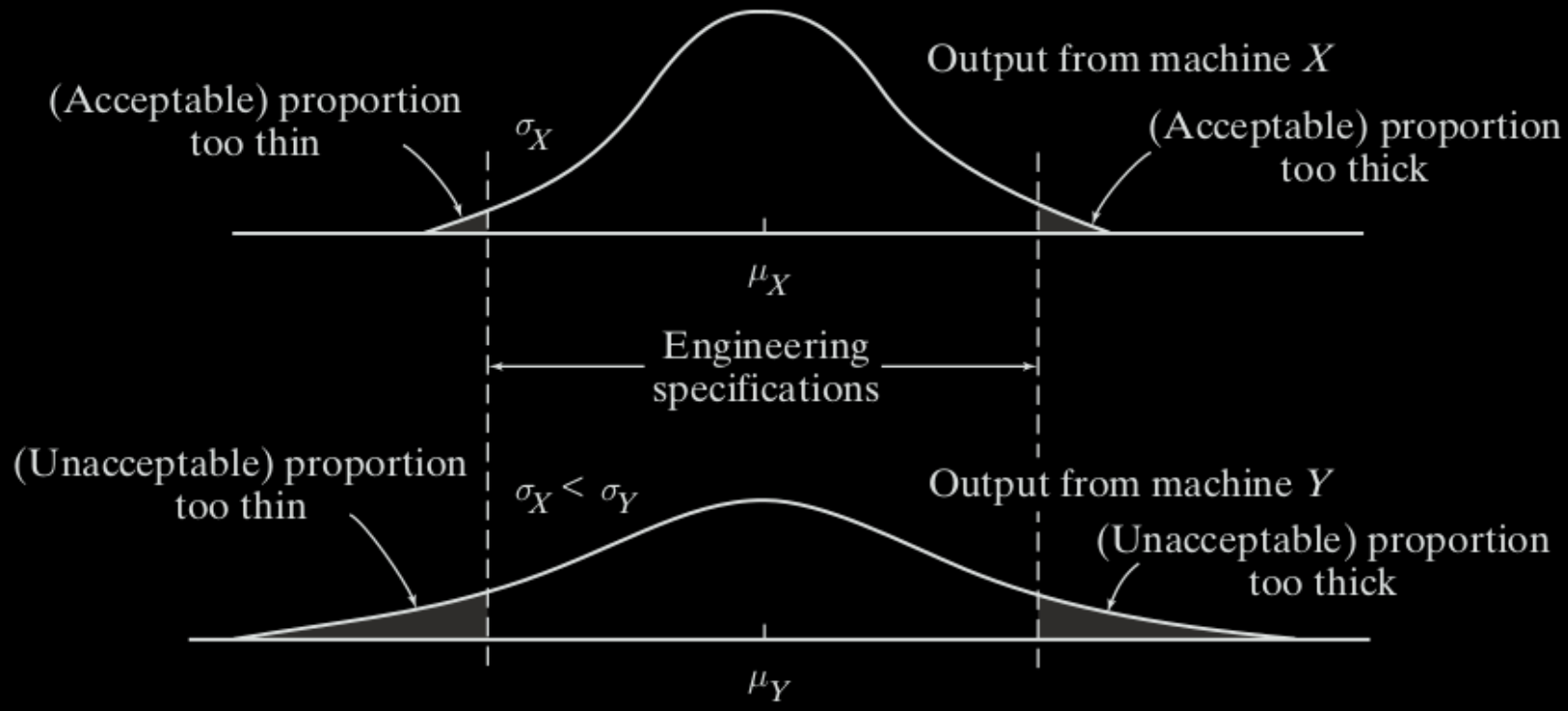
Mot. 1



Mot. 2 To test $H_0 : \mu_X = \mu_Y$ under the assumption $\sigma_X^2 = \sigma_Y^2$, we need to first test $\sigma_X^2 = \sigma_Y^2$.

Testing $H_0 : \sigma_X^2 = \sigma_Y^2$

v.s.

(at the α level of significance)

$H_1 : \sigma_X^2 < \sigma_Y^2$:	$H_1 : \sigma_X^2 \neq \sigma_Y^2$:	$H_1 : \sigma_X^2 > \sigma_Y^2$:
Reject H_0 if	Reject H_0 if	Reject H_0 if
$s_Y^2/s_X^2 \leq F_{\alpha,m-1,n-1}$	$s_Y^2/s_X^2 \geq F_{1-\alpha/2,m-1,n-1}$ or $s_Y^2/s_X^2 \leq F_{\alpha/2,m-1,n-1}$	$s_Y^2/s_X^2 \geq F_{1-\alpha,m-1,n-1}$

E.g. Electroencephalograms (EEG).

Twenty inmates in a Canadian prison, randomly split into two groups of equal size: one in solitary confinement, one in their own cells.

Measure the alpha waves. Whether the observed difference in variability is significant (set $\alpha = 0.05$.)

Table 9.3.1 Alpha-Wave Frequencies (CPS)

Nonconfined, x_i	Solitary Confinement, y_i
10.7	9.6
10.7	10.4
10.4	9.7
10.9	10.3
10.5	9.2
10.3	9.3
9.6	9.9
11.1	9.5
11.2	9.0
10.4	10.9

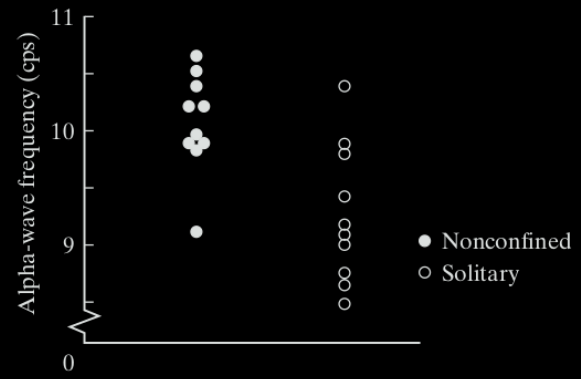


Figure 9.3.2 Alpha-wave frequencies (cps).

Sol. ... □

Another example here:

https://www.itl.nist.gov/div898/handbook/eda/section3/eda359.htm