# Introduction to data science & artificial intelligence (INF7100)

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#242 Testing

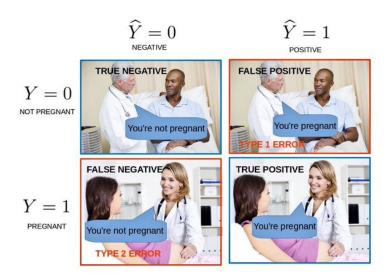
été 2020

## Testing and Errors



Drunkometer, How Police Nab Drunk Drivers.

### Type I and Type II Errors



via Ofreakonometrics's tweet.

#### Type I and Type II Errors

We want to test some (null) hypothesis  $H_0$ . A positive result corresponds to rejecting the null hypothesis, while a negative result corresponds to failing to reject the null hypothesis.

- ► Type I error is rejection of a true null hypothesis, e.g. convicting an innocent defendant in court. equivalent to a false positive probability of type I error is  $\alpha$  called significance level
- ► Type II error is the failure to reject a false null hypothesis, i.e. acquitting a criminal in court equivalent to a false positive probability of type II error is  $\beta$ , and  $-\beta$  is called power

E.g.  $H_0$ : "The message is not a spam"

### Type I and Type II Error Balance

Traditionally we try to set Type I error probability as 5% or 1%, as in there is only a 5 or 1 in 100 chance that the variation that we are seeing is due to chance.

E.g. on student's height,  $H_0: \mu_M = \mu_F + 10 \mathrm{cm}$ 

