1 Tests for central tendency

Note Title 8/23/2011

This week: tests of 1 or 2 means
population vs. data discussion

ex population (theory) has a mean of μ_0
our data, however, has a mean of $\bar{x}$

Usually, we see $\mu_0 \neq \bar{x}$. So, do we conclude our hypothesis is wrong? Not always

- In order to answer this, we need to know the distribution of $\bar{X}$ if the theory is correct. That is, if the population mean is μ_0

We make an

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

Normal distribution
variance
expected value
"is distributed as"

For now let us pretend we know σ^2

Thm 2.1

If $X \sim N(\mu, \sigma^2)$ then $\bar{X} \sim N(\mu, \sigma^2/n)$

our test statistic

$$Z := \frac{\bar{X} - \mu_0}{\sqrt{\sigma^2/n}} \sim N(0,1)$$

just standardization

The t-statistic

$$T := \frac{\bar{X} - \mu_0}{\sqrt{s^2/n}} \sim t(\overset{\nu}{df} = n-1)$$

note this difference

"degrees of freedom"

the t-dist's parameter

Paired data = Repeated measurements

data looks like this

ID	mmt 1	mmt 2	diff
1	9	10	1
2	10	21	11
3	4	1	−3
5	16	12	−4

t-test

? Does tmt have an effect?

Assume Normality & equal variances.

Two samples <u>INDEPENDENT</u>

§2.4 1. If samples come from populations with equal variance, we perform an "equal variance" test.

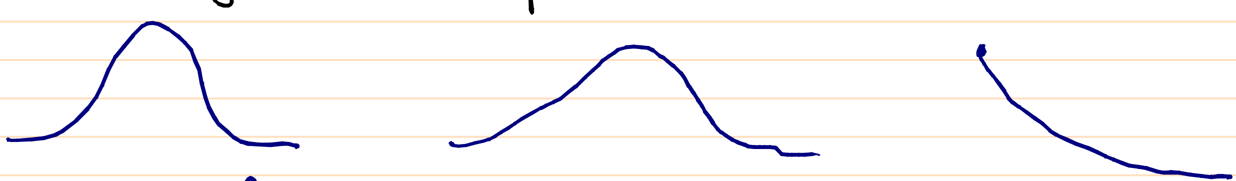
§2.5 2. Otherwise, we perform the "unequal variance" test.

Assumption: Mmts Normally distributed

What if mmts <u>not</u> dist Normally? (App. B)

You need a "large enough" sample size.

How large? It depends on X's distribution:



"Normal" $n=2$ "Cauchy" $n=30$ "Exponential" $n=500$

Next Week:
- ANOVA
- Tests when n is too small.