

# Math650 Homework 3.2

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## Abstract

Speed Limits and Traffic Fatalities

## 1 Introduction

Here we investigate the question whether the increase of speed limits caused the traffic fatalities to increase.

## 2 Materials and Methods

Question Chap2 No23, Data from its CDROM and R software.

## 3 Results

Sample 1 is percentage change data of states which increased speed limits. Sample 2 is data of states which didn't change speed limits.

Result Table	mean of sample 1	13.75312
	mean of sample 2	-8.563158
	mean difference	22.31628
	sd of sample 1	21.33285
	sd of sample 2	31.00085
	degrees of freedom of pooled sd	49
	pooled sd	25.31707
	standard error for the difference	7.33241
	t statistic	3.043513
	p-value of t statistic	0.001876831

All R codes are appended(5).

## 4 Conclusion and Discussion

Here there's neither random selection nor random allocation of units to groups. We can't directly say there's a strong causal relationship between speed limits and traffic fatalities. However, based on the tiny p-value(0.001876831), the actual data differs substantially from the expected outcome under the model which assumes no increase of traffic fatalities after increasing speed limits.

## 5 Appendix

function *t\_test\_func* is same as in math650\_hw3\_1.

```
#chap 2, No23
data = read.csv("/usr/local/doc/statistical_sleuth/ASCII/ex0223.csv")
sample_data1 = data[data$INCREASE=="Yes",]$FATALITIESCHANGE
sample_data2 = data[data$INCREASE=="No",]$FATALITIESCHANGE
t_test_func(sample_data1, sample_data2)
```

Output is this (disregarding those lines with df=12):

```
mean_f: 13.75312
mean_r: -8.563158
mean difference: 22.31628
sd_f: 21.33285
sd_r: 31.00085
degrees_of_freedom_of_pooled_sd: 49
pooled_sd: 25.31707
standard_error_for_the_difference: 7.33241
percentile_97_5th, df=12: 2.179
conf_interv_of_difference_of_mu_lower, df=12: 6.338962
conf_interv_of_difference_of_mu_upper, df=12: 38.2936
t_stat: 3.043513
percentile_97_5th: 2.009575
conf_interv_of_difference_of_mu_lower: 7.581254
conf_interv_of_difference_of_mu_upper: 37.05131
p-value of t_stat 0.001876831
```