

Math 455

Class 23

March 24

Midterm 1: Mean ≈ 105 (of 166)

Std. Dev ≈ 20 .

- Check the arithmetic on the front of your test.
- Requests for regrades must be in writing.
I will regrade your entire test. Your score may go up or ~~down~~ down.

8 (b): " $\bar{X}$ is an independent random variable,

(A) because $X_1, \dots, X_4$ are iid."

(B) " W is an independent random variable,
because of the experimental design of $X_1, \dots, X_4$."

(C) " $\bar{X}$ and W are independent, because $X_1, \dots, X_4$
are independent, and $\bar{X}$ and W are two
different functions of the independent RVs
 $X_1, \dots, X_4$."

What's wrong: Independence is defined for 2
(or more) RVs. See Wackerly, et al.
Def'n 5.8, Sec. 5.4.

There is no such thing as " $\bar{X}$ is an
independent RV"

Only " $\bar{X}$ and W are independent RVs."

In (B), $X_1, \dots, X_4$ are not regression data.
They were defined to be iid $N(0, 1)$ in the
statement of the problem. "Experimental
design" is therefore not relevant.

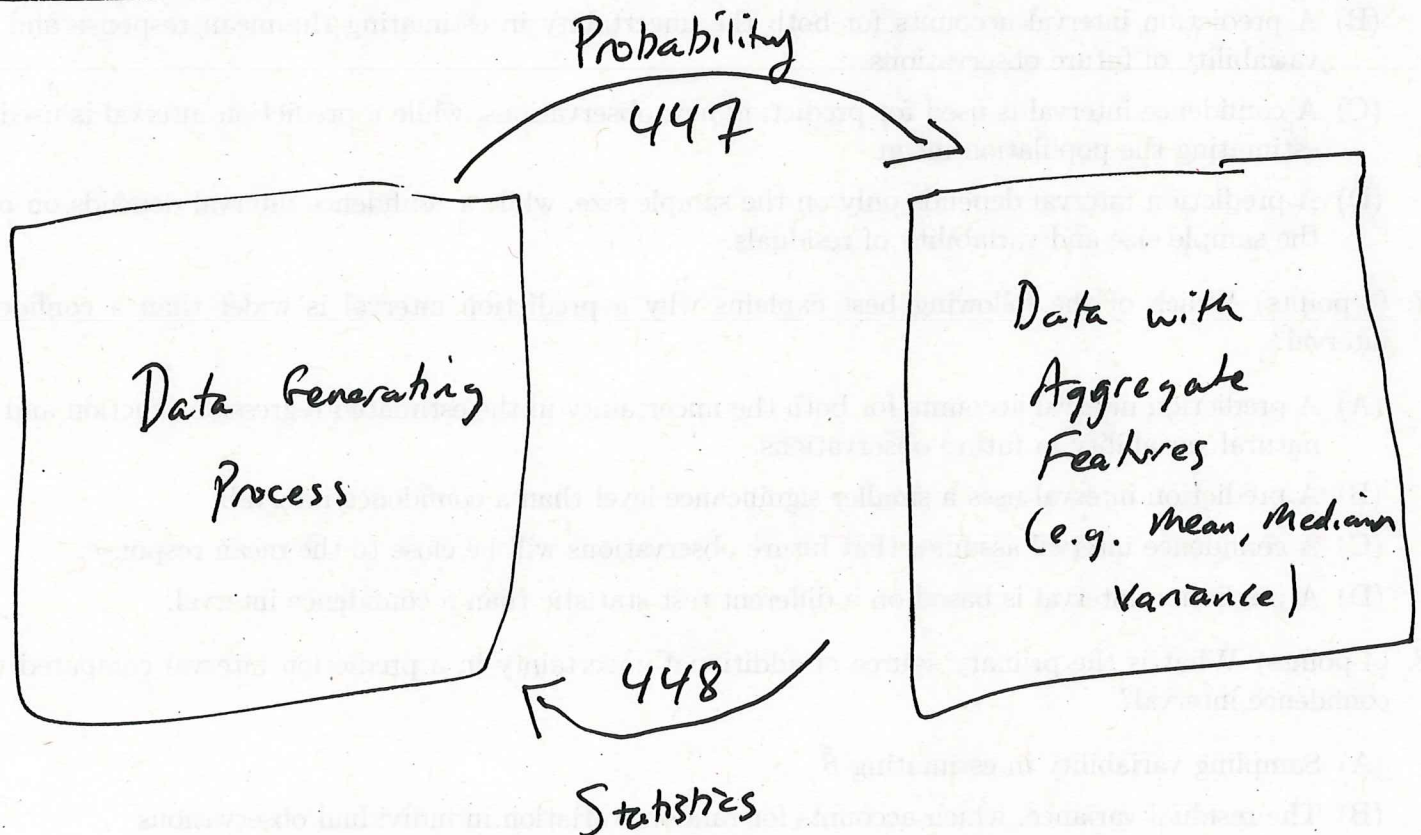
In ②, the choice of functions matters.

Suppose $U = f(x_1, \dots, x_4)$
 $V = g(x_1, \dots, x_4)$

$$f(x_1, \dots, x_4) = x_1 + x_2$$

$$g(x_1, \dots, x_4) = x_1 + x_2 + 5$$

$U = V - 5$ so U and V are NOT
independent RVs.



In Regression, we want to be able to use
both directions.

9 c) "Best means that the variance between the estimators $\hat{\beta}_0, \hat{\beta}_1$ is minimized."

(B) "Best means that the ~~set~~ estimators $\hat{\beta}_0, \hat{\beta}_1$ fit the data best."

(C) "Best means that the sum of squares is minimized."

(D) "Best means that the variance between $\hat{\beta}_0$ and β_0 is minimized."

What's wrong: $\hat{\beta}_0$ is a RV and has, by itself a variance. "Variance between $\hat{\beta}_0$ and $\hat{\beta}_1$ "

doesn't make sense and isn't part of the

Gauss-Markov Thm.

"Covariance between $\hat{\beta}_0$ and $\hat{\beta}_1$ " would make sense, and we know a result on this (see Faraway p. 33)

In (D) β_0 is a parameter, fixed but unknown

So it doesn't even make sense to consider ~~the~~ the covariance of $\hat{\beta}_0$ and β_0 .

Section 7.1: Apply Math 447 to figure out what happens if variables have errors in them.

There will be a problem on MT2 based on this.

The work will be broadly similar to that of problem 7 on MT 1.