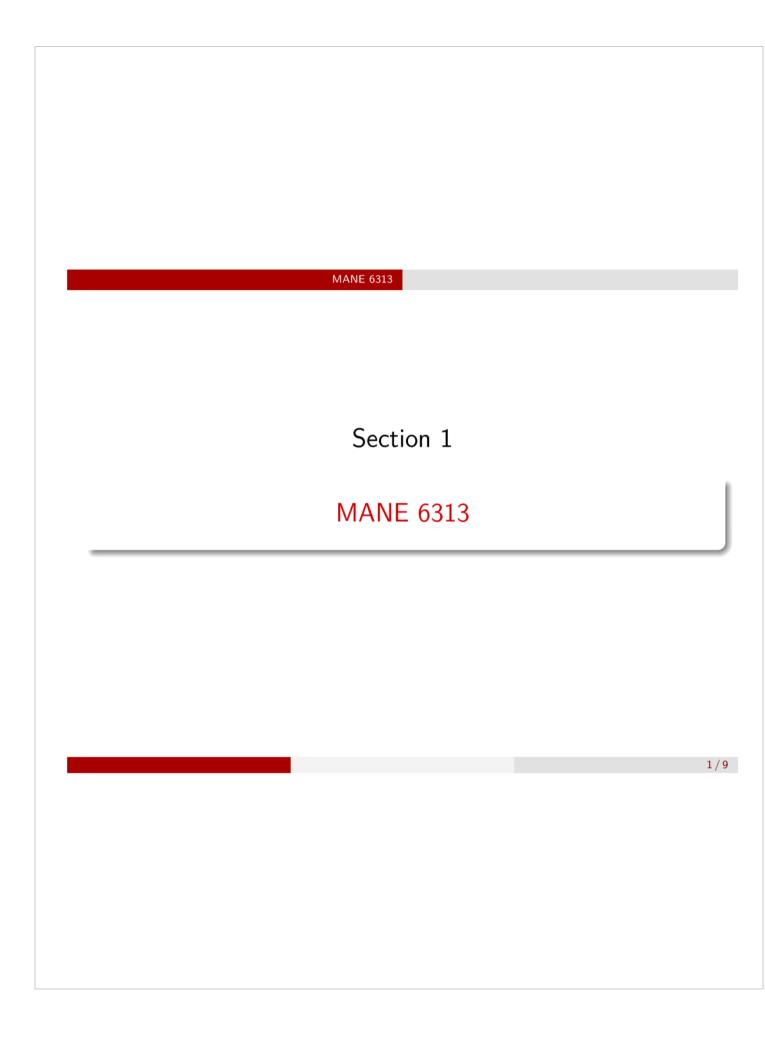
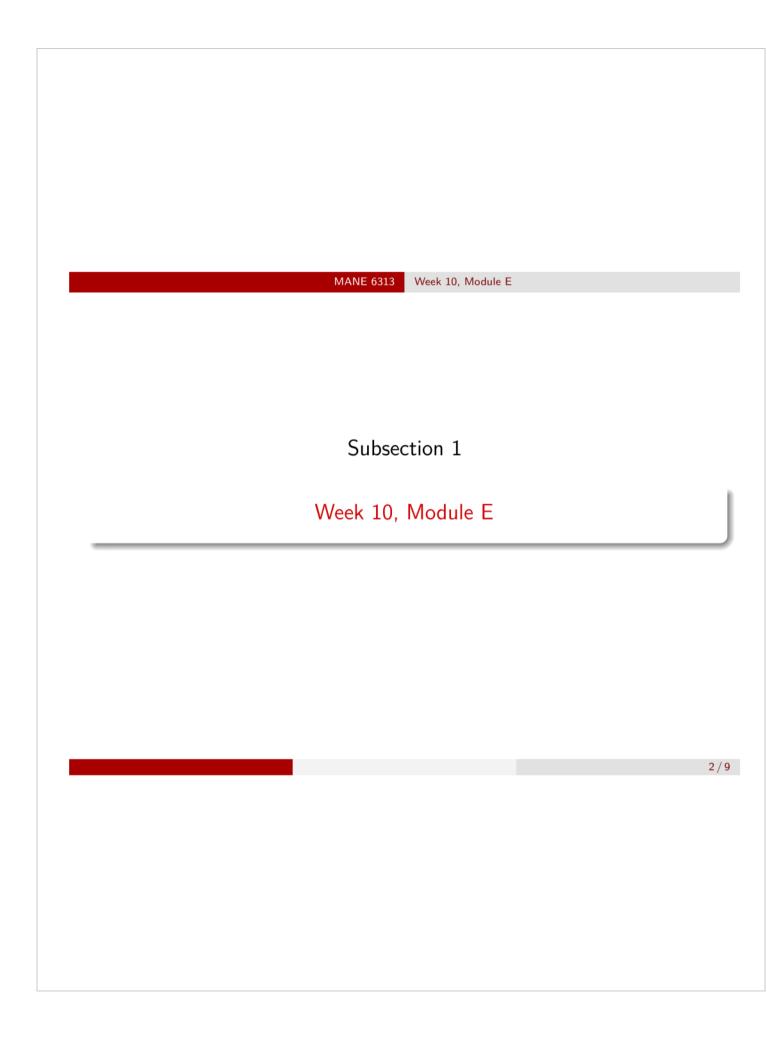
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Saturday, March 18, 2023 10:45 AM



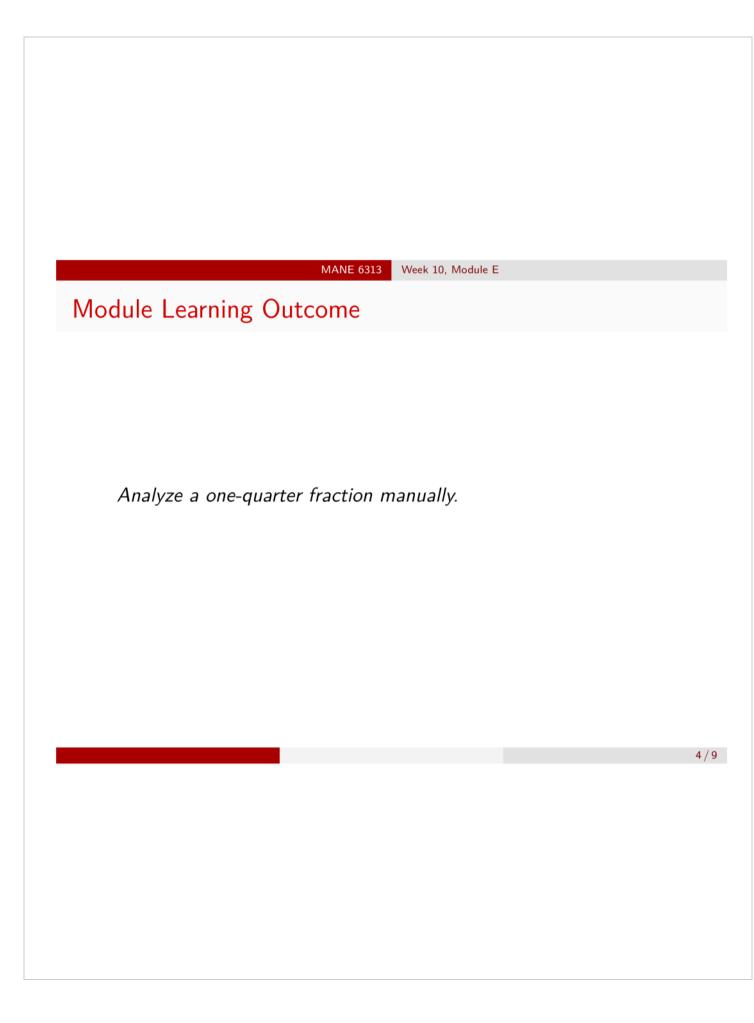


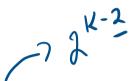
MANE 6313

Week 10, Module E

Student Learning Outcome

- Select an appropriate experimental design with one or more factors,
- Select an appropriate model with one or more factors,
- Evaluate statistical analyses of experimental designs,
- Assess the model adequacy of any experimental design, and
- Interpret model results.





The quarter-fraction of the 2^k Design

- You must select two generators, I = P and I = Q
- Don't forget the generalized interaction. The *complete defining* relation is I = P = Q = PQ
- There are four possible fractions formed by the combinations of $(\pm P, \pm Q)$
- The principal fraction is defined by I = P = Q
- The complementary fractions are I=-P=Q, I=P=-Q, I=-P=-Q

Quarter Fraction Example - Problem 8.11 (Textbook 9th edition)

An article in Industrial and Engineering Chemistry ("More on Planning Experiments to Increase Research Efficiency," 1970, pp. 60-65) uses a 2⁵⁻² design to investigate the effect of A = condensation temperature, B = amount of material 1, C = solvent volume, D = condensation time, and E = amount of material 2 on yield. The results obtained are as follows:

$$e = 23.2$$
 $ad = 16.9$ $cd = 23.8$ $bde = 16.8$ $ab = 15.5$ $bc = 16.2$ $ace = 23.4$ $abcde = 18.1$

- (a) Verify that the design generators used were I = ACE and I = BDE.
- (b) Write down the complete defining relation and the aliases for this design.
- (c) Estimate the main effects.
- (d) Prepare an analysis of variance table. Verify that the AB and AD interactions are available to use as error.

9 6 5 0 - E(VB)

			MA	NE 6313 Week 1	0, Module E	
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Defining Relation

Full Defining Reation I = ACE = BDE = ABCDE2 = ACE = BDE = ABCD Aliasing for Main Effects

la = A(I = ACE = BDE = ABCD) = AI = AZE = ABDE = AZBCD = A = CE = ABDE = BCD la=B(I=ACE=BDE=ABCD)=>B=ABCE=DE=ACD l = C(T= ACE=BDE=ABCD) -7 C= AE = BCDE = ABD 20 = D(J = ACE = BDE = ABCD) -7 D = ACDE = BE = ABC OE - E(I=A(E)=BD=A8(0) = E=A(=BD=A8'9E

MANE 6313

Week 10, Module E

Aliasing for Interaction Effects

2 - Factor Interactions

There are (4)=6 two-factor interactions:

AB, AC, AD, BC, BD, CD

DAB: AB(I = ACE = BDE= ABCD)

: AB = ABCE = ABODE = CD

: AB = BCE = ADE = CD

DAC: AC(I = ACE = BDE = ABCD)

: AC = E = ABCDE = BD

RAD: AD (I = ACE = BDE = ABCD)

: AD = CDE = ABE = BC