14. (15 pts) The following is a **2^4 Half Fractional** Test Design. **Determine Contrasts, SS, MSE, Fs, Fα, factor effects, and Acceptance or Rejection** of the Null Hypothesis for Main factors **A & B** and Interaction **CD.** Test the Hypothesis **Ho: A = B = CD = 0** at a level of significance of **.05** i.e. no significant difference in factor levels or interaction. The Residual/Sum of Squares Error (SSE) is given below. **(Show All Work)**

$F_{0.05}(1,3) = 10.10$ $\quad SumSq = \frac{(Contrast)^2}{r2^k}$

$0.5(2^K)$

2^4 Half Fractional Test Design

		A (-)		A (+)		Row Sum
		B (-)	B (+)	B (-)	B (+)	
C (+)	D (+)	24			25	49
	D (-)		23	16		39
C (-)	D (+)		20	21		41
	D (-)	17			21	38
Column Sum		41	43	37	46	167

1DOF = 1

r = 0.5

Contrast^2 / r2^k

Contrasts: sum +, −

A: $-41-43+37+46 = -1$

B: $-41+43-37+46 = 11$

CD: $49-39-41+38 = 7$

$\frac{(-1)^2}{0.5(2^2)} = \frac{1}{2}$

$\frac{(11)^2}{0.5(2^4)} = 15.1250$

same ↓ ↓ MSE / MSE

Contrast / r2^{k-1}

$\frac{-1}{0.5(2^2)} = -1$

$\frac{11}{0.5(2^3)} = \frac{11}{4}$

Fill in Blanks with Answers Here:

Source	Deg. Of Freedom	Contrast	Sum Squares	Mean Squares	Fs	$F_{.05}$	Factor Effect	Accept/Reject Ho:
Main Factors								
k=2 A	1	−1	0.5	0.5	0.0833	10.10	−1	rej
k=4 B	1	11	15.1250	15.1250	2.5208	10.10	2.75	rej
Interactions								
k=4 C-D	1	7	0.875	0.875	0.1458	10.10	1.75	rej
Residual (SSE)	**3**		**6.0**	6.0				

15. (5 pts) Calculate and plot the **AD Interaction.** (Show Y-axis scaling). Would you expect this interaction to be significant? **Why or why not**?

AD Interaction: (5)

$24+17+23+20-16+21+25-21 = 113$ (÷4)

$-24+20 = -44/2 = -22$ $\quad 23+17 = 40/2 = 20$

$25+21 = 46/2 = 23$ $\quad -16-21 = -37/2 = -18.5$