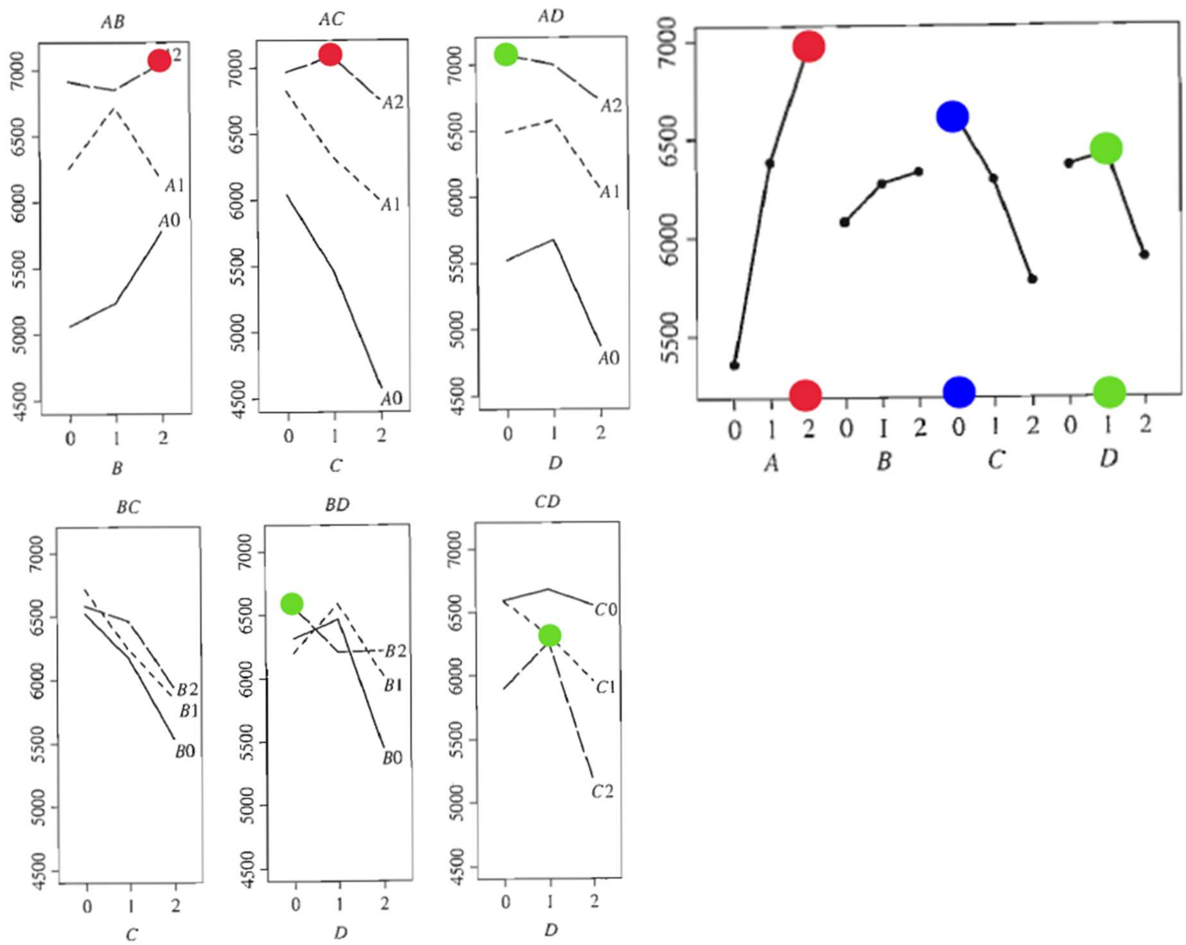
Charles Hesketh

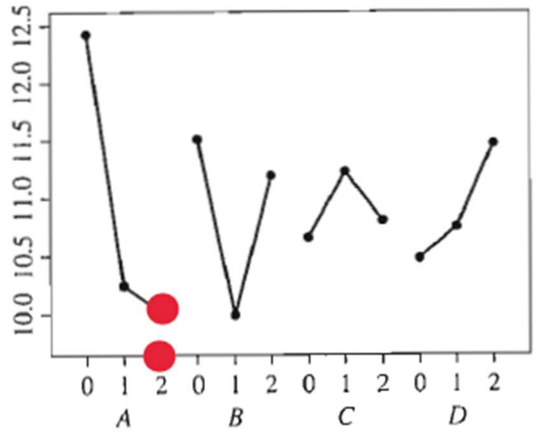
Exam 4

Problem 1

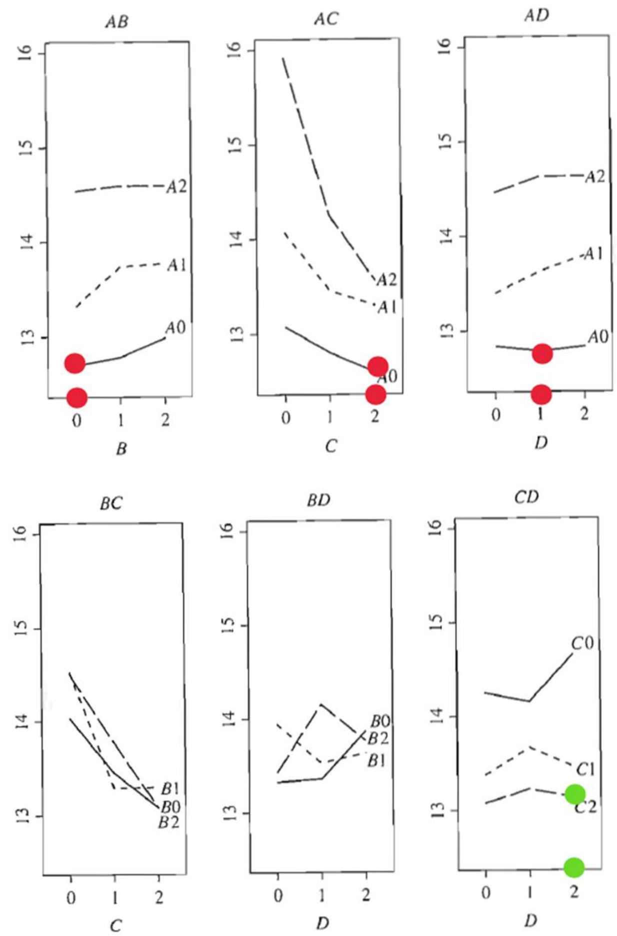


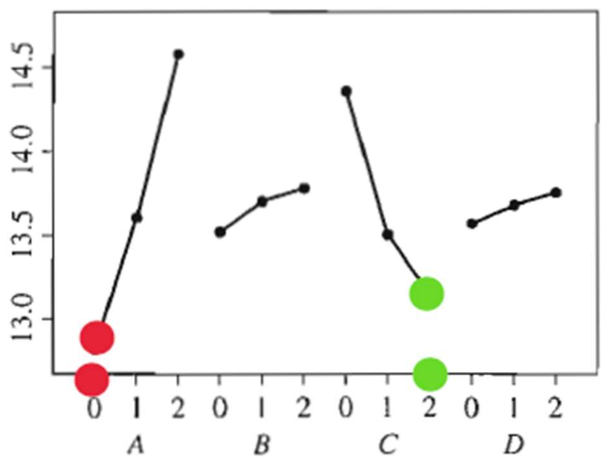
A) The graph on the right, top shows our main effects for strength location and suggests that A, C, and D are maximized at the color dots: **A=2, C=0, D=1**. Since **A x B, C x D, A x C,** and **B x D** have significance then we will look at **AB=CD**$^{\mathbf{2}}$ and **AC=BD**$^{\mathbf{2}}$. In particular, the **A x B** plot suggest that **A=2** is maximized at **B=2** and **A x C** suggests **A=2** is maximized at **C=1.** Similarly, **C x D** suggest that **C=0** is maximized at **D=1**; however, after results of **A x C**, we will be choosing **C=1**, since **A** is considered to be more significant, resulting in **D=0.** We have **B x D** suggesting that **B=2** (from **A x B** plot results) is maximized when **D=0**. This suggests that **A=2, B=2, C=0**, and **D=1** (choosing **D=1** over **D=0** by MF graph) will maximize our strength location. Notice that **C=0** did not minimize **A=2** in **AB**, instead it **was C=1**, but **A** is the only factor that is significant for strength dispersion, so **A** takes priority. This yields the final result of

<A,B,C,D>=<2,2,0,1>.



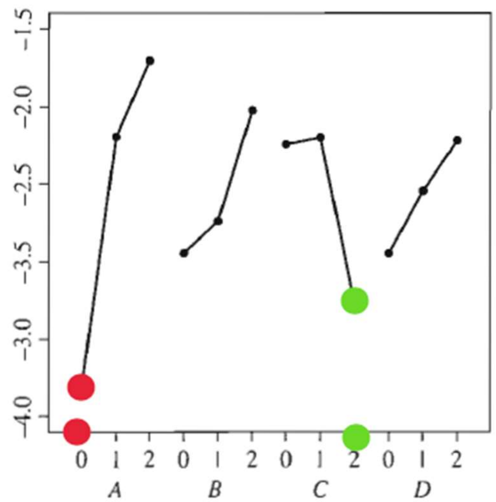
The above graph is the main effects for dispersion. As we can see this suggests that **A=2** will minimize dispersion, further suggesting our above results were selected properly. Since **A** is the only significant factor for dispersion, then we shouldn't use it to suggest values for the other factors.





B) Factor **A** and **C** are significant in the dispersion location so we can select **A=0** and **C=2**. From **A x B, A x C, A x D** we get **B=0** and **D=2** with the **A x C** graph agreeing with our initial choices in above**.** The selection of **D** has minimal impact in **A x D** and **C x D** so any value (0,1,2) would be suffice. Thus,

<A,B,C,D>=<0,0,2,1>.



Looking at flash dispersion we see that the graph agrees in **A=0** and **C=2** further supporting our choices given that **A** is the only significant factor. Based on this graph I may lean toward **D=0**, but again it is not significant.

Problem 2

a) Multiplying both sides of **D=ABC** by $\mathbf{D^2}$ and $\mathbf{E=A^2BC}$ by $\mathbf{E^2}$ we get $\mathbf{I=ABCD^2}$ and $\mathbf{I=A^2BCE^2}$. By convention we would like A^2 to have a power of one so $\mathbf{(A^2BCE^2)^2=AB^2C^2E=I}$ and this will be the alias we use. Multiplying $\mathbf{(ABCD^2)(AB^2C^2E)=A^2D^2E}$ or $\mathbf{(A^2D^2E)^2=ADE^2}$ to keep convention. Furthermore we need to calculate $\mathbf{(ABCD^2)^2(AB^2C^2E)=BCDE}$. This implies that we have **Resolution III** and our defining contrast subgroup is

$$\mathbf{I=ABCD^2=AB^2C^2E=BCDE=ADE^2}$$

b) Calculating the MF results in:

Aliased:	$\mathbf{I=ABCD^2}$	$\mathbf{AB^2C^2E}$	**BCDE**	$\mathbf{ADE^2}$	$\mathbf{A^2B^2C^2D}$	$\mathbf{A^2BCE^2}$	$\mathbf{B^2C^2D^2E^2}$	$\mathbf{A^2D^2E}$
A	AB^2C^2D	$ABCE^2$	ABCDE	AD^2E	BCD^2	BCE^2	$AB^2C^2D^2E^2$	$\mathbf{DE^2}$

c) Aliased for all MF, with clear interactions highlighted:

Aliased:	$\mathbf{I=ABCD^2}$	$\mathbf{AB^2C^2E}$	**BCDE**	$\mathbf{ADE^2}$	$\mathbf{A^2B^2C^2D}$	$\mathbf{A^2BCE^2}$	$\mathbf{B^2C^2D^2E^2}$	$\mathbf{A^2D^2E}$
A	AB^2C^2D	$ABCE^2$	ABCDE	AD^2E	BCD^2	BCE^2	$AB^2C^2D^2E^2$	$\mathbf{DE^2}$
B	AB^2CD	AC^2E	$BC^2D^2E^2$	ABD^2E	ACD^2	ABC^2E	CDE	AB^2DE^2
C	ABC^2D^2	AB^2E	BC^2DE	$ADCE^2$	ABD^2	AB^2CE	BDE	AC^2DE^2
D	ABC	AB^2C^2DE	BCD^2E	AD^2E^2	ABCD	$AB^2C^2D^2E$	BCE	$\mathbf{AE^2}$
E	$ABCD^2E$	$AB^2C^2E^2$	$BCDE^2$	**AD**	$ABCD^2E^2$	AB^2C^2	BCD	ADE

Aliased for all 2-fis, with clear interactions highlighted:

Aliased:	**I=ABCD^2**	**I=AB^{2}C^{2}E**	**I=BCDE**	**I=ADE^2**	**I=A^{2}B^{2}C^{2}D**	**I=A^{2}BCE^2**	**I=B^{2}C^{2}D^{2}E^2**	**I=A^{2}D^{2}E**
AB	ABC^2D	ACE^2	AB^2CDE	AB^2D^2E	**CD^2**	BC^2E	$AC^2D^2E^2$	BD^2E
AC	AB^2CD	ABE^2	ABC^2DE	AC^2D^2E	**BD^2**	BC^2E^2	$AB^2D^2E^2$	CD^2E
AD	AB^2C^2	$ABCD^2E^2$	$ABCD^2E$	ADE	BCD	$BCDE^2$	$AB^2C^2E^2$	**E**
AE	$AB^2C^2DE^2$	ABCE	$ABCDE^2$	**AD^2**	BCD^2E^2	**BC**	$AB^2C^2D^2$	**DE**
BC	$AB^2C^2D^2$	**AE**	BCD^2E^2	$ABCDE^2$	**AD^2**	ABCE	**DE**	$AB^2C^2DE^2$
BD	AB^2C	AC^2DE	BC^2DE^2	ABD^2E^2	ACD	ABC^2D^2E	**CE**	AB^2E^2
BE	AB^2CE	AC^2E^2	BC^2D^2E	ABD	ACD^2E^2	ABC^2	**CD**	AB^2DE
CD	ABC	AB^2DE	BC^2D^2E	ACD^2E^2	ABD	AB^2CD^2E	**BE**	AC^2E^2
CE	$ABCD^2E$	AB^2E	BC^2DE^2	ACD	ABD^2E^2	AB^2C	**BD**	AC^2DE
DE	ABCE	$AB^2C^2DE^2$	BCD^2E^2	**AD**	$ABCDE^2$	AB^2CD	**BC**	**AE**
AB^2	AC^2D	AB^2CE^2	ACDE	ABD^2E	BC^2D	**CE^2**	$ABC^2D^2E^2$	BDE^2
AC^2	AB^2D	ABC^2E^2	ABDE	ACD^2E	BC^2D^2	**BE^2**	$AB^2CD^2E^2$	CDE^2
AD^2	$AB^2C^2D^2$	$ABCDE^2$	ABCE	**AE**	**BC**	BCD^2E^2	$AB^2C^2DE^2$	**DE**
AE^2	AB^2C^2DE	ABC	ABCD	ADE^2	BCD^2E	BCE	$AB^2C^2D^2E$	**D**
BC^2	AB^2D^2	ACE	BD^2E^2	ABC^2DE^2	AC^2D^2	ABE	CD^2E^2	AB^2CDE^2
BD^2	AB^2CD	AD^2C^2E	BC^2E^2	ABE^2	**AC**	ABC^2DE	CD^2E	$AB^2D^2E^2$
BE^2	$AB^2CD^2E^2$	**AC^2**	BC^2D^2	ABDE	ACD^2E	ABC^2E^2	CDE^2	AB^2D
CD^2	ABC^2D	AB^2D^2E	BC^2E	ACDE	**AB**	AB^2CDE	BD^2E	$AC^2D^2E^2$
CE^2	$ABC^2D^2E^2$	**AB^2**	BC^2D	ACDE	ABD^2E	AB^2CE^2	BDE^2	AC^2D
DE^2	$ABCE^2$	$AB^2C^2DE^2$	BCD^2	AD^2E	ABCDE	$AB^2C^2D^2E^2$	BCE^2	**A**

d) The only MF or 2-fis that are clear are B, C, and BC^2 as all other 2-fis are aliased with another 2-fi or MF. All other MF are aliased with at least one 2-fi.

Aliased:	**I=ABCD^2**	**I=AB^{2}C^{2}E**	**I=BCDE**	**I=ADE^2**	**I=A^{2}B^{2}C^{2}D**	**I=A^{2}BCE^2**	**I=B^{2}C^{2}D^{2}E^2**	**I=A^{2}D^{2}E**
B	AB^2CD	AC^2E	$BC^2D^2E^2$	ABD^2E	ACD^2	ABC^2E	CDE	AB^2DE^2
C	ABC^2D^2	AB^2E	BC^2DE	$ADCE^2$	ABD^2	AB^2CE	BDE	AC^2DE^2
BC^2	AB^2D^2	ACE	BD^2E^2	ABC^2DE^2	AC^2D^2	ABE	CD^2E^2	AB^2CDE^2

Even though **BC^2** is clear, since **BC** is not clear then **B x C** is not clear. This implies **A x B, A x C, A x D, A x E, B x C, B x D, B x E, C x D, C x E, D x E** are all not clear since both their components are not clear.