Exam 1996 2

a)

The experiment is planned since the values of the predictors are *chosen*. The experiment uses an *balanced* design, i.e. the same number of observations for each combination of predictor-variables. (In this case 1)

b)

Since the number of previous experiments can affect the outcome. Having a random order removes the correlation between the predictors and the number of previous experiments.

c)

The degrees of freedom for each factor is the number of levels -1, in our case $2-1=1$ for each factor. We know that the total number sum of the degrees of freedoms should equal the *Total* degrees of freedom, i.e. 7, so the residual degrees of freedom should be $7-1-1-1=4$

The *Mean sum of squares* are calculated by dividing the *Sum of squares* by the corresponding *df*s.

The F values are calculated as the *Mean sum of square* for each category divided by the residual *Mean sum of squares*.

P-value ranges can be found by looking in the F table.

df	SS	MS	F	P
1	1058.0	1058.0	20.64	<0.05
1	50.0	50.0	0.98	>0.05
1	4.5	4.5	0.09	>0.05
4	205.0	51.25		
7	1317.5			

d)

Since we only have one observation per predictor-combination, we probably dont have enough data to discern possible interaction effects. If we include all interactions in the model (i.e AB, AC, BC, ABC) we will adapt the model perfectly to the data, but are not able to say anything about the cerainty of our estimates (Since we are left with 0 residual degrees of freedom). If we only include pairwise interactions (AB, AC, BC), we would only have one residual degree of freedom, and would so need an F value of 161.4 to show a significant effect.