```
/* Montgomery 7.2 */
proc import datafile="/home/u63048916/STAT571B/Homework/Homework 6/Q7-2.xlsx"
    dbms=xlsx
    out=mont7_2
    replace;
    getnames=yes;
run;

data inter;
    set mont7_2;
        A=Size;
        B=Speed;
        AB=Size*Speed;
        block=Block;
        resp=Vibration;

proc glm data=inter;                    /* GLM Proc to Obtain Effects */
 class A B AB block;
 model resp=block A B AB;
 output out=diag r=res p=pred;
 run;

/* check normality */
proc univariate data=diag normal;
var res;
qqplot res / normal (mu=est sigma=est);
run;

/* check constant variance using graph*/
title 'residual plot: res vs predicted value ';
proc sgplot data=diag;
scatter x=pred y=res;
refline 0;
run;
```

1. **Montgomery 7.2**

Blocking replicated 2^2design (replicates into 4 blocks). Model is

$$y_{ijk} = \mu + \tau_i + \beta_j + (\tau\beta)_{ij} + \delta_k + \epsilon_{ijk}$$

$$i = 1, 2 \; j = 1, 2 \; k = 1, 2, 3, 4$$

7.2. Consider the experiment described in Problem 6.5. Analyze this experiment assuming that each one of the four replicates represents a block.

6.5. A router is used to cut locating notches on a printed circuit board. The vibration level at the surface of the board as it is cut is considered to be a major source of dimensional variation in the notches. Two factors are thought to influence vibration: bit size (A) and cutting speed (B). Two bit sizes ($\frac{1}{16}$ and $\frac{1}{8}$ in.) and two speeds (40 and 90 rpm) are selected, and four boards are cut at each set of conditions shown below. The response variable is vibration measured as the resultant vector of three accelerometers (x, y, and z) on each test circuit board.

			Replicate			
A	**B**	**Treatment Combination**	**I**	**II**	**III**	**IV**
−	−	(1)	18.2	18.9	12.9	14.4
+	−	*a*	27.2	24.0	22.4	22.5
−	+	*b*	15.9	14.5	15.1	14.2
+	+	*ab*	41.0	43.9	36.3	39.9

(**a**) Analyze the data from this experiment.

(**b**) Construct a normal probability plot of the residuals, and plot the residuals versus the predicted vibration level. Interpret these plots.

(**c**) Draw the AB interaction plot. Interpret this plot. What levels of bit size and speed would you recommend for routine operation?