```
/* lab 8: fractional factorial design */
data filter;
input A B C y;
D=A*B*C;
datalines;
-1 -1 -1 45
 1 -1 -1 100
-1 1 -1 45
 1 1 -1 65
-1 -1 1 75
 1 -1 1 60
-1 1 1 80
 1 1 1 96
;
run;

proc print data=filter;
run;

data inter;                              /* Define Interaction Terms */
 set filter;
 AB=A*B; AC=A*C; AD=A*D;
run;


proc glm data=inter;                    /* GLM Proc to Obtain Effects */
 class A B C D AB AC AD;
 model y=A B C D AB AC AD;
 estimate 'A' A 1 -1;  estimate 'B' B 1 -1;
  estimate 'C' C 1 -1;  estimate 'D' B 1 -1;
estimate 'AB' AB 1 -1;
estimate 'AC' AC 1 -1;
estimate 'AD' AD 1 -1;
 run;


proc reg outest=effects data=inter;    /* REG Proc to Obtain Effects */
 model y=A B C D AB AC AD;
 run;

 proc print data=effects;
 run;

data effect2; set effects;
 drop y intercept _RMSE_;
 run;

proc transpose data=effect2 out=effect3;
run;

data effect4;
set effect3;
effect=col1*2;
heffect=abs(effect);
run;

/* draw normal probablity plot */
proc sort data=effect4; by effect;
run;

proc rank data=effect4 out=effect5 normal=blom;
 var effect;
ranks neff;
 run;

proc sgplot data=effect5;
scatter x=neff y=effect/datalabel=_NAME_;
xaxis label='Normal Scores';
run;


/* draw half normal probablity plot */
proc sort data=effect4; by heffect;
run;

proc rank data=effect4 out=hnranks;
var heffect;
ranks hneffect;
run;

data hnormals;
set hnranks nobs=n;
hneff=probit(((hneffect-1/3)/(n+1/3))/2+.5); /* calculate half normal scores */
run;

proc print data=hnormals;
run;

 title 'Half Normal Probability Plot';
proc sgplot data=hnormals;
scatter x=hneff y=heffect/datalabel=_NAME_;
xaxis label='Half Normal Score';
run;

/* run ANOVA model on the selected terms */

proc glm data=inter;                    /* GLM Proc to Obtain Effects */
 class A C D AC AD;
 model y=A C D  AC AD;
run;

proc reg data=inter;
```

```
model y=A C D  AC AD;
run;
```