Math 343 - Lab 7

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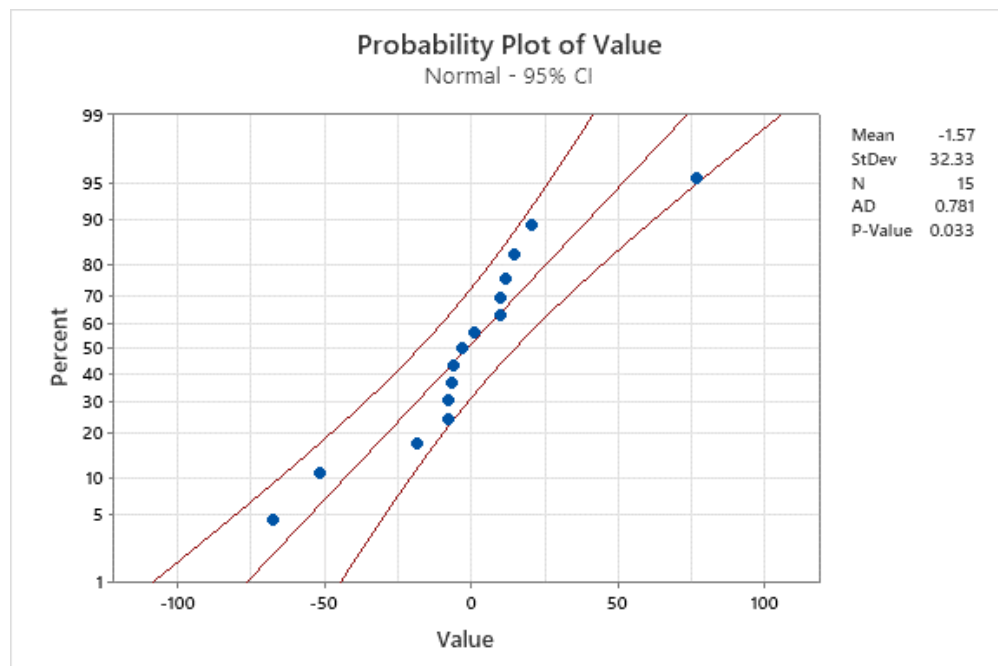June 1, 2023

Question 1

a)

Figure 1: Normal Probability Plot from Minitab.

b)
It would appear that only the effect of A is dominant.

Question 2

a)

Figure 2: Normal Probability Plot from Minitab.

b)

Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
A	1	72.909	72.909	1110.47	0.000
B	1	126.461	126.461	1926.11	0.000
C	1	103.464	103.464	1575.85	0.000
D	1	30.662	30.662	467.01	0.000
A*B	1	29.927	29.927	455.81	0.000
A*C	1	128.496	128.496	1957.11	0.000
A*B*C	1	78.751	78.751	1199.45	0.000
Error	24	1.576	0.066		
Lack-of-Fit	8	0.277	0.035	0.43	0.888
Pure Error	16	1.299	0.081		
Total	31	572.246			

Figure 3: ANOVA Table from Minitab.

Since the p-value $< \alpha$ for each effect, they are all significant.

c)

$$SS_{Effect} = \left(n2^{k-2}\right)\left(\text{Est. Effect}\right)^2$$
$$= \left(2 \cdot 2^{4-2}\right)(3.0189)^2$$
$$= 8 \cdot 9.11375721$$
$$= 72.91005768$$

Yes this value is effectivly the same.

d)

$$-39.79 \pm t_{\alpha/2, df_{error}} \cdot \sqrt{\frac{MSE}{n2^{k-2}}}$$
$$\pm t_{0.025, 24} \cdot \sqrt{\frac{0.066}{2 \cdot 2^{4-2}}}$$
$$\pm 2.064 \cdot \sqrt{\frac{0.066}{2 \cdot 2^{4-2}}}$$
$$\pm 2.064 \cdot \sqrt{0.00825}$$
$$\pm 0.1874721099$$

We are 95% confident that the true value of the main effect of AC is between -39.977, and -39.602.