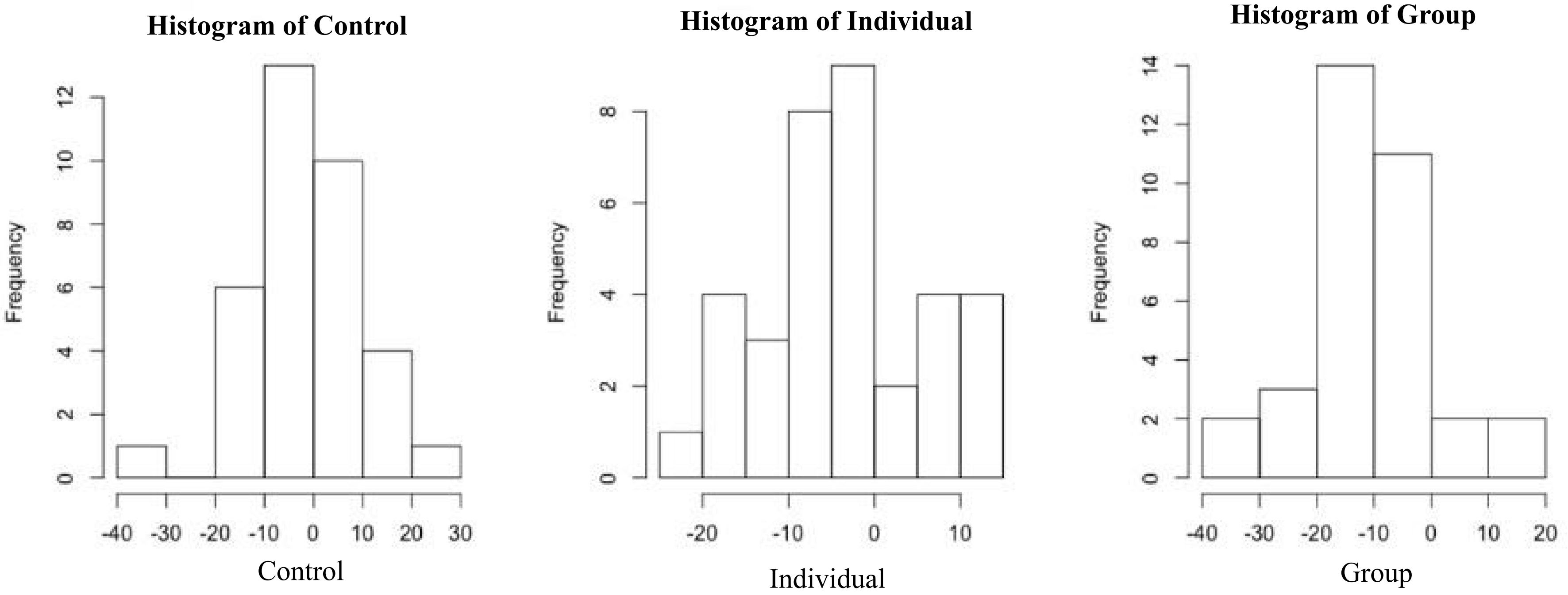
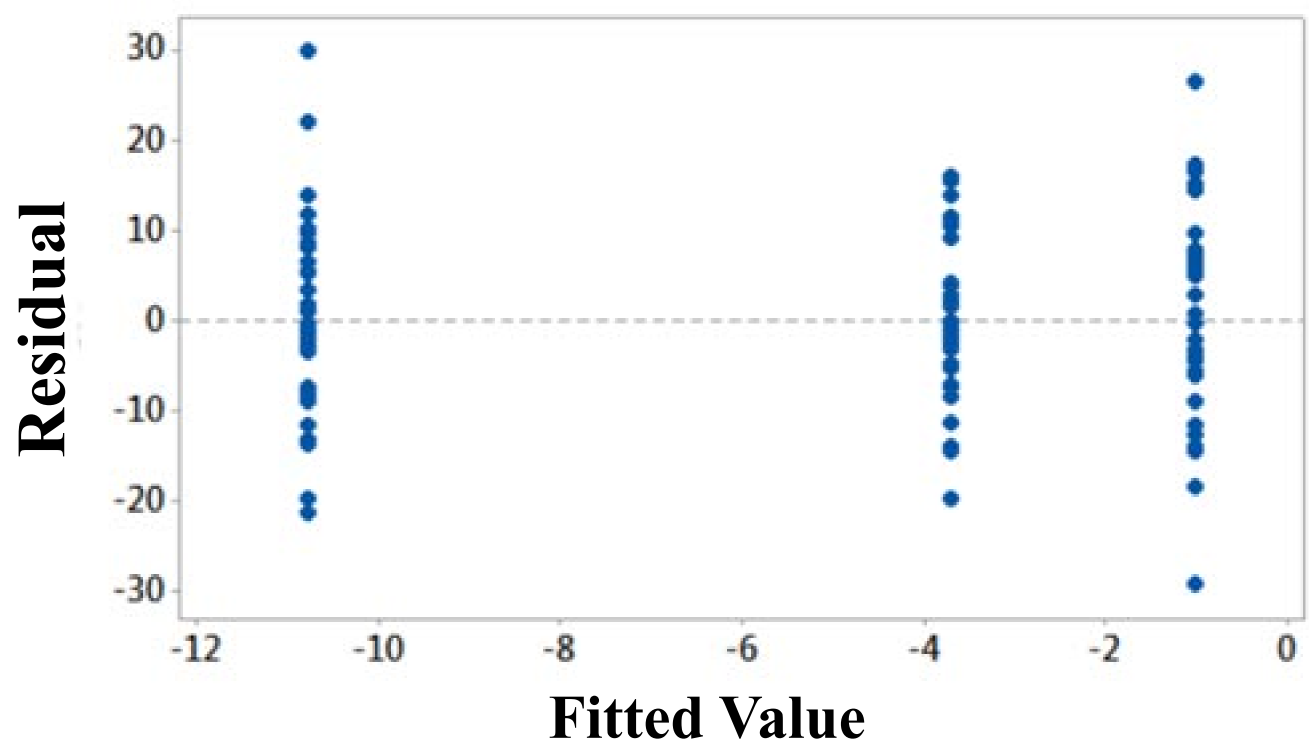
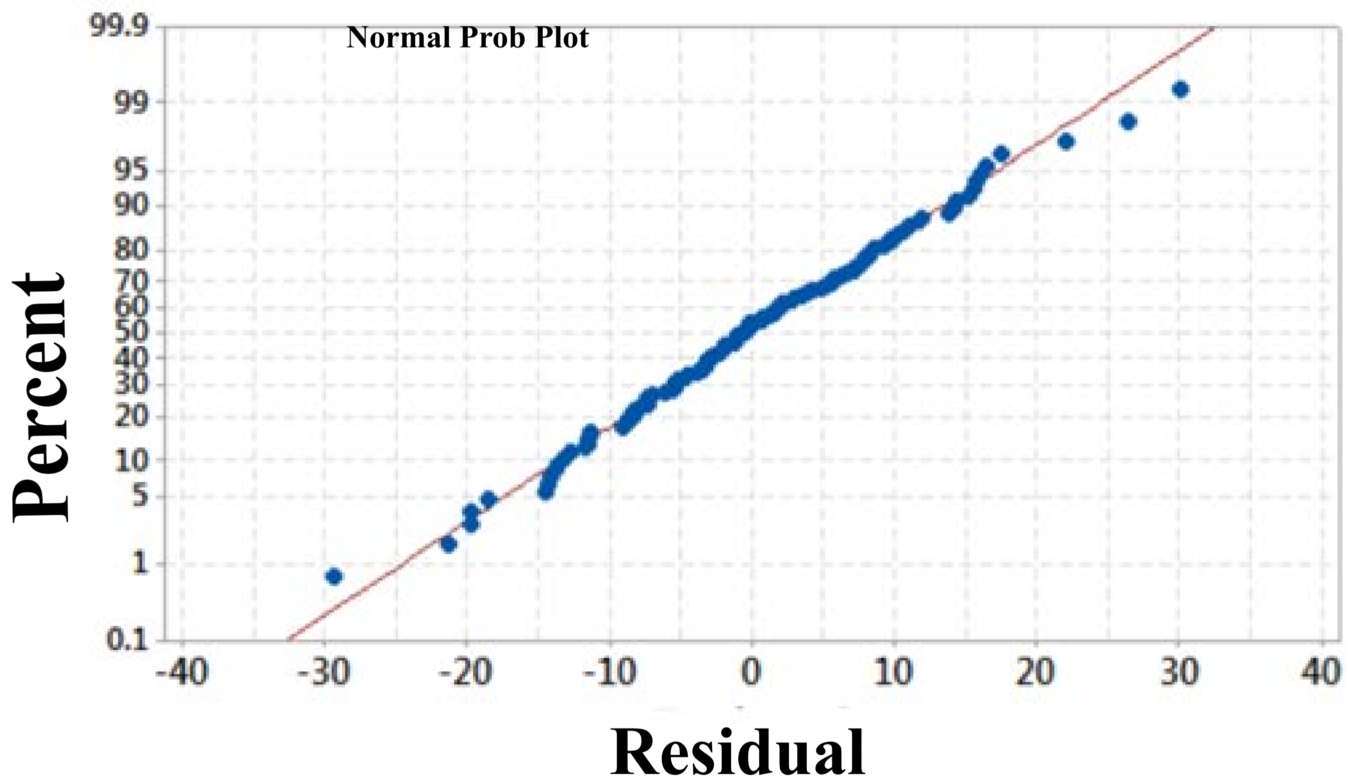

Histogram of Control
Frequency
0
2
4
6
8
10
12
-40
-30
-20
-10
0
10
20
30
Control
Histogram of Individual
Frequency
0
2
4
6
8
-20
-10
0
10
Individual
Histogram of Group
Frequency
0
2
4
6
8
10
12
14
-40
-30
-20
-10
0
10
20
Group

Residual Plot



Normal Prob Plot



Ali Kolenarz

Homework 7

12.31

a)

Groups	S.S	Mean	Std. Dev
Control	35	-1	11.5
Ind.	35	-3.7	9.08
Group	34	-10.79	11.14

b) Yes it is reasonable because
$2(9.08) = 18.16 > 11.5$

c) See pg.1 for graphs
From the graphs we can feel confident that the sample is approximately normal. Although The Ind. and control have some traits of different distributions, the sample size makes it acceptable

12.32

a) $H_0: \mu_1 = \mu_2 = \mu_3$
$H_a: \mu_1 \neq \mu_2 \neq \mu_3$

$\bar{X} = \frac{35(-1) + 35(-3.7) + 34(-10.79}{104}$

$\bar{X} = -5.1$

$f = 7.7678$

$df = 2$

$P(F > 7.7678)$
$= 1 - pf(7.7678, 2, 101)$
$= 7.28 \times 10^{-4} < 0.05$

Since the p-value is less than the significance level of 0.05, we reject the H_0

b.) Graphs see pg.2. The residual plot shows two outliers but the residuals are symmetrical. The residuals also appear approximately normal from the Normal Prob Plot

c) $T_{i,j} = \dfrac{\bar{X}_i - \bar{X}_j}{\sqrt{S_p^2\left(\frac{1}{n_i} + \frac{1}{n_j}\right)}}$ $\quad s_p^2 = \dfrac{SSE}{n-k} = 112.8$

Ind − Control $= |-1.063|$
Ind − Group $= |-2.767|$
Control − Group $= |-3.822|$

$P(|T_{i,j}| > |t_{i,j}|) = 2[1 - pt(|t_{i,j}|, n-k)] < \alpha$

$n - k = 104 - 3 = 101$

Ind − Control $= 0.29$
Ind − Group $= 6.72 \times 10^{-3}$
Control − Group $= 2.28 \times 10^{-4}$

Ind − Control : $0.29 > 0.05$, therefore we fail to reject H_0, $\mu_{Ind} = \mu_{control}$

Ind − Group: < 0.05, therefore we reject H_0, $\mu_{Ind} \neq \mu_{Group}$

Control − Grp: < 0.05, therefore we reject H_0, $\mu_{control} \neq \mu_{Grp}$

d) Based on the ANOVA test in (a), the groups have different means. In (c) all groups have different means <u>except</u> the Ind and control pairing.

12.33

a)

Groups	S.S	Mean	Std. Dev
Control	35	-0.45	5.22
Ind	35	-1.68	4.13
Grp	34	-4.9	5.06

b)

Source	df	SS	MS	F	p-value
Grp	2	362.1	181.05	7.7628	7.28×10^{-4}

The values are still the same as 12.32 (a), therefore dividing by 2.2 does not change the normality of the data.

12.41

a)

$\mu_1, \mu_2, \mu_3, \mu_4$ = blue, brown, gaze down, green respectively

$$\psi_1 = \mu_2 - \frac{(\mu_1 + \mu_4)}{2}$$

b) $$\psi_2 = \frac{(\mu_1 + \mu_2 + \mu_4)}{3} - \mu_3$$

12.42

a) ψ_1: $H_0: \psi_1 = 0$ $\quad$ ψ_2: $H_0: \psi_2 = 0$

$H_a: \psi_1 \neq 0$ $\quad$ $H_a: \psi_2 \neq 0$

b) $$C_1 = 3.72 - \frac{7.05}{2} = 0.195$$

$$C_2 = \frac{3.19 + 3.72 + 3.76}{3} - 3.11 = 0.48$$

c) $S_p = 1.68$

$$SE_{c_1} = 1.68\sqrt{\frac{1}{37} - 0.25\left(\frac{1}{67}+\frac{1}{77}\right)} = 0.3098$$

$$SE_{c_2} = 168\sqrt{1/9\left(\frac{1}{67}+\frac{1}{37}+\frac{1}{77}\right)+\frac{1}{41}} = 0.2933$$

d) $t_1 = \dfrac{0.195}{0.3098} = 0.631$

$df = 218$

$p\text{-value} = 0.523 > 0.05$

Since the p-value is greater than α, we fail to reject H_0

$t_2 = \dfrac{0.48}{0.2933} = 1.64$

$df = 218$

$p\text{-value} = 0.102 > 0.5$

Since the p-value is greater than α, we fail to reject H_0

e) $C_1: 0.195 \pm 0.6564 = (-0.41064, 0.80064)$

$C_2: 0.48 \pm 0.574 = (-0.094, 1.054)$