MATH 204 – Assignment 1 Solutions

Memory Task Data Set: Response is Number of Words remembered, Factor is Memory Training method.

(a) ANOVA TABLE (from SPSS)

ANOVA F-test statistic F=9.085

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	351.520	4	87.880	9.085	.000
Within Groups	435.300	45	9.673		
Total	786.820	49			

ANOVA F-test p-value = 0.000. (to three decimal places)

Thus the result of the ANOVA F-test implies that we can

REJECT H_0

Therefore we reject the hypothesis of equal treatment means at the 5% significance level (and, indeed, at every significance level greater than 0.1%).

at significance levels α = 0.05/0.01, and conclude that there is a significant difference between the treatment means.

(15 Marks)

For completeness: the exact *p*-value is 1.815e-05. Critical values are
- α = 0.05, $C_R = F_\alpha(4,45) = 2.579$ (textbook gives $F_\alpha(4,40) = 2.61, F_\alpha(4,60) = 2.53$)
- α = 0.01, CR = $F_\alpha(4,45) = 3.767$ (textbook gives $F_\alpha(4,40) = 3.83, F_\alpha(4,60) = 3.65$)
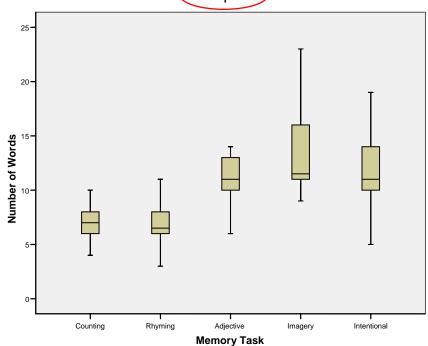
(b) Checking the Assumptions:

(i)   Independent samples: this is apparently a completely randomized design, so this assumption is met.

(ii)   Normality of the populations: visual inspection of the boxplot below provides no categorical evidence that the normality assumption is violated. This could be tested more formally.

(iii) Equal Variances: Levene's test (below) implies that the equality of variances is not rejected at the 5% level (p=0.054)

(5 Marks)

SPSS Output

Boxplot

Boxplot indicates that the assumption of normality may be valid, although this is perhaps questionable. A formal test would probably be needed.

Memory Task

Descriptives

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Counting	10	7.00	1.826	.577	5.69	8.31	4	10
Rhyming	10	6.90	2.132	.674	5.38	8.42	3	11
Adjective	10	11.00	2.494	.789	9.22	12.78	6	14
Imagery	10	13.40	4.502	1.424	10.18	16.62	9	23
Intentional	10	12.00	3.742	1.183	9.32	14.68	5	19
Total	50	10.06	4.007	.567	8.92	11.20	3	23

Levene's Test of Homogeneity of Variances

Number of Words

Levene Statistic	df1	df2	Sig.
2.529	4	45	.054

Levene's Test p-value = 0.054.

Therefore no reason to reject the hypothesis of equal variances at the 5% significance level.