One Factor ANOVA		TUKEY's METHOD		Problem 428[18]		Hormone Data				
Level	J=# obs	\bar x_{l, . }	s_{l, .}							devsq l
1	4	12.75	4.19324854	13	17	7	14			52.75
2	4	17.75	3.59397644	21	13	20	17			38.75
3	4	17.5	2.081666	18	15	20	17			13
4	4	11.5	4.65474668	7	11	18	10			65
5	4	10	3.91578004	6	11	15	8			46
I =	J=	\bar x_{ . , . }		SST=		SSTr				SSE =
5	4	13.9		415.8		200.3				215.5
	df E =		df Tr =				SSE + SSTr =	415.8		
	15		4							
	MSE =		MSTr =		f =		P = Prob(f ≥	3.48549884	)	
	14.3666667		50.075		3.48549884		0.03335772			
			alpha =		Crit f(alpha)=		max s_l / min s_l =			
			0.05		3.05556828		2.23606798			
	Enter Upper-Tail, alpha-critical, Studentized range for				alpha =	df numer.=	df denom.=	Q_{alpha,I,I(j-1)}=		
					0.05	5	15	4.37		
	Width of simultaneous CI for difference of means w=				8.28188983					
	Simultaneous CI for differences of means									
	mu_1 - mu_2	-5		mu_1 - mu_3	-2.75		mu_1 - mu_4	1.25		
	-13.2818898	3.28188983		-11.0318898	5.53188983		-7.03188983	9.53188983		
	mu_1-mu_5	2.75								
	-5.53188983	11.0318898								
	mu_2 - mu_3	0.25		mu_2 - mu_4	6.25		mu_2 - mu_5	7.75		
	-8.03188983	8.53188983		-2.03188983	14.5318898		-0.53188983	16.0318898		
	mu_3 - mu_4	6		mu_3 - mu_5	7.5					
	-2.28188983	14.2818898		-0.78188983	15.7818898					
	mu_4 - mu_5	1.5								
	-6.78188983	9.78188983								
Large differences:		1	2	3	4	5				
	1		-1	-1	-1	-1				
	2			-1	-1	-1				
	3				-1	-1				
	4					-1				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Row 1	4	51	12.75	17.58333333
Row 2	4	89	17.75	12.9166666
Row 3	4	70	17.5	4.333333333
Row 4	4	46	11.5	21.66666667
Row 5	4	40	10	15.33333333

ANOVA

Source of Variatio	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	200.3	4	50.075	3.4854988	0.0333577	2.901294536
Within Groups	215.5	15	14.3666667			
Total	415.8	19				

Contrast: avg level 4 and 5 different from avg level 1, 2, 3?

alpha = 0.05

t_{alpha/2, df E) = 2.131449536

(\bar x_1+\bar x_2+\bar x_3)/3-(\bar x_4+\bar x_5)/2 =

4.5

(1/3)^2 + (1/3)^2 + (1/3)^2 + (-1/2)^2 + (-1/2)^2 =

0.833333333

2-sided CI for (mu_1+mu_2+mu_3)/3-(mu_4+mu_5)/2

0.812496478 8.187503522