5. Data Analysis

The data we analyze are from the scores of Calculus exams (midterm and final) that were applied to a class of students from Department of Chemistry, National Taiwan Normal University. In this class, there are 32 male students and 8 female students. We are interested in whether the correlations between the two scores (midterm and final) are different among male and female students.

The data are shown in the following.

male students

midterm	68	74	58	53	68	72	71	61	45	76	57
final	64	75	62	55	79	24	74	59	26	36	38
midterm	44	60	71	79	58	69	80	85	84	82	49
final	27	31	43	75	56	49	42	73	64	44	66
midterm	73	80	57	58	40	47	83	59	9	50	
final	78	76	62	56	14	48	67	38	0	28	

female students

midterm	60	61	64	64	68	76	55	37
final	51	39	57	79	66	55	64	19

Let

r_m =Pearson correlation coefficient for male students's midterm and final scores.

r_f =Pearson correlation coefficient for female students's midterm and final scores.

CI(I)= Confidence Interval I.

CI(II)= Confidence Interval II.

CI(III)= Confidence Interval III.

LI= length of CI(I).

LII= length of CI(II).

LIII= length of CI(III).

The analysis results are displayed in Table 7.

Table 7

r_m	r_f	$r_m - r_f$
0.637717	0.664064	-0.026347
CI(I)	CI(II)	CI(III)
$[-0.72082, 0.66813]$	$[-0.41220, 0.46489]$	$[-0.38934, 0.35886]$
LI	LII	LIII
1.38895	0.87710	0.74820
LII−LIII	LI−LIII	LI−LII
0.12889	0.64075	0.51185

We can see from Table 7 that the confidence interval III provides the most precise result among the three intervals. Based on this confidence interval, we are 95% confident to say that

$$-0.38934 \leq \rho_m - \rho_f \leq 0.35886.$$

It seems that the difference of the correlation coefficients among male and female students are not statistically significant.