12.3 Suppose in Review Exercise 11.53 on page 437 that we were also given the number of class periods missed by the 12 students taking the chemistry course. The complete data are shown.

Student	Chemistry Grade, y	Test Score, x_1	Classes Missed, x_2
1	85	65	1
2	74	50	7
3	76	55	5
4	90	65	2
5	85	55	6
6	87	70	3
7	94	65	2
8	98	70	5
9	81	55	4
10	91	70	3
11	76	50	1
12	74	55	4

Based on the regression output you've provided, here's a **detailed analysis** of the results from the multiple linear regression model:

🔍 1. Objective of the Analysis

You are examining how **intelligence test scores (x1)** and **number of class periods missed (x2)** predict **chemistry grades (y)** for 12 freshmen students.

📊 2. Regression Model Summary

Metric	Value	Interpretation
Multiple R	0.8648	Strong positive linear relationship between predicted and actual grades.
R Square	0.7478	74.78% of the variation in chemistry grades is explained by x1 and x2.
Adjusted R Square	0.6918	Adjusted for number of predictors; still shows good model fit.
Standard Error	4.5173	Average deviation of predicted values from actual grades.

🧠 **Interpretation**: The model fits the data well, explaining about 75% of the variability in students' chemistry grades.

🧮 **3. ANOVA Table (Model Significance)**

Source	df	SS	MS	F	Significance F
Regression	2	544.60	272.30	13.34	0.0020
Residual	9	183.65	20.41		
Total	11	728.25			

🔍 **Interpretation**:

- The overall regression model is **statistically significant** ($p = 0.00203 < 0.05$).
- This indicates that at least one of the predictors (x1 or x2) contributes meaningfully to predicting chemistry grades.

📌 **4. Coefficients Analysis**

Predictor	Coefficient	Std. Error	t Stat	P-value	95% CI	Interpretation
Intercept	27.55	12.50	2.20	0.055	[-0.73, 55.82]	Marginally insignificant ($p > 0.05$), may not differ significantly from 0.
x1 (Intelligence Score)	**0.922**	0.186	4.96	**0.00078**	[0.50, 1.34]	**Highly significant** predictor. Higher intelligence scores are strongly associated with better chemistry grades.
x2 (Class Misses)	0.284	0.754	0.38	0.71477	[-1.42, 1.99]	Not statistically significant. Absences don't appear to have a reliable impact.

📌 **5. Key Insights**

✅ **Significant Predictor:**

- **x1 (Intelligence Score)** has a **strong, positive, and statistically significant** impact on chemistry grades.
    - For every unit increase in intelligence test score, the grade increases by about **0.92 points**, holding x2 constant.

❌ **Non-Significant Predictor:**

- **x2 (Class Periods Missed)** has **no statistically significant effect** on chemistry grades in this dataset.
    - Wide confidence interval and high p-value (0.71477) suggest a weak relationship.

🧻 **Conclusion**

- Your model is a **good fit**, explaining **~75%** of the variation in chemistry grades.
- **Intelligence test scores (x1)** are a **strong and significant predictor** of chemistry grades.
- **Class absences (x2)** do **not** significantly influence grades in this small sample.
- Consider re-evaluating the role of x2 in future models or collecting more data to reduce uncertainty.