Statistics May 2026

The last quiz for this year from me.

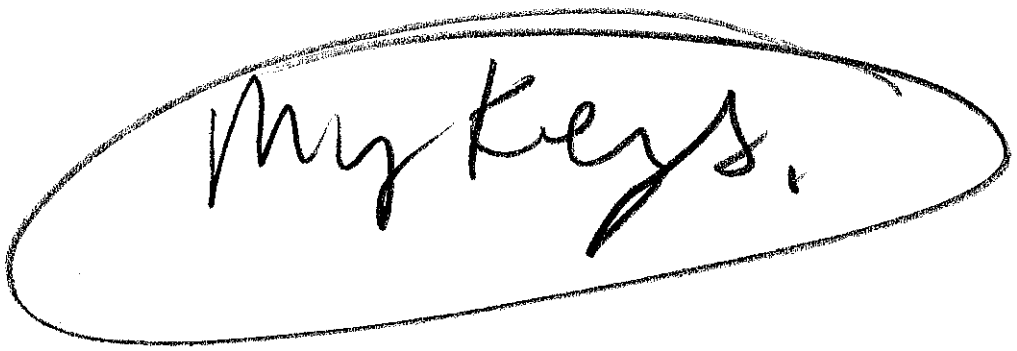
I've attached sample problems.

The Answers will be available at

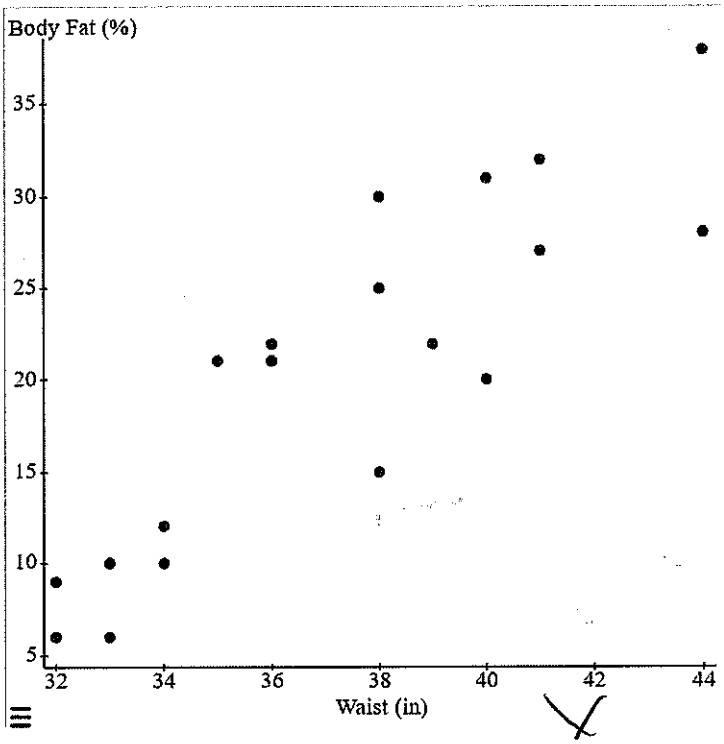
https://danlemay.net/wordpress/?cat=25

soon.

Sometime between today and Friday May 29th at 2:30, you'll need to complete the actual quiz. You do not have to complete it all in one sitting.



It is difficult to determine a person's percent of body fat without immersing them in water. Researchers are hoping to find ways to make a good estimate, immersed 20 male subjects, then measured their waists. Here is a scatterplot of their collected data along with the summary statistics.



y

x

Column	Mean	Std. dev.
Waist (in)	37.05	3.8178942
Body Fat (%)	19.75	9.5634997

Correlation = 0.887

(1)

$\text{Slope} = \frac{9.56}{3.82}(.887)$

≈ 2.2

$y\text{-int} = 19.75 - (2.2)(37.05)$

≈ -62.5

See next page

1. Create a linear model to predict %Body Fat from the Waist size,
2. Using your model, predict the %Body Fat for a male with a 37 inch waist.
3. Is this an example of extrapolation? Why or Why not.
4. If $r^2 = 78.7\%$, how does this help us to explain the utility of this linear mode?
5. Interpret the slope of the model.

(1) $\widehat{\%\,Body\,Fat} = 2.2(Waist\,Circumference) - 62.5$

(2) $2.2(37) - 62.5 \simeq \boxed{18.9\%}$

(5) This is not an example of extrapolation. Thirty-seven is inside the range of the collected data. If I had tried to use this equation to make a prediction for a 28" waist or a 52 inch waist, those results would have been an example of extrapolation because they are outside of the range of the collected data.

(7) 78.7% of the change in % body-fat can be explained by a change in waist circumference. 21.3% of the change is due to effect of lurking variables

This means it is a fairly strong association between waist circumference and % body-fat.

(5) For every additional one inch increase in waist circumference there is a 2.2% increase in the percent of body fat,

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(2) χ^2-GOF follow a known distribution

Actual	expected (These are out of 100)
35	50
40	30
20	12
1	6
4	2

Claim H_0: Student absences follow the Faculty perception

H_1: H_0 is false

4 d.f. STAT: TEST; D χ^2 GOF-Test

$\chi^2 = 19.33$

P-value = .0007

Reject H_0.

Go To Quiz sheet

Conclusion Boilerplate

If the alternative hypothesis supports the claim:

- Reject H_0: The data supports the claim that ...
- Fail to reject H_0: There is not enough data to support the claim that ...

If the null hypothesis supports the claim:

- Reject H_0: There is enough data to justify rejection of the claim that ...
- Fail to reject H_0: There is not enough data to justify rejection of the claim that...

There is enough data to justify the rejection of the claim that student absenteeism follows faculty perceptions

You will only be assigned one of the two types of χ^2 GOF tests on the quiz.

Type 1: Follows a known distribution

Absenteeism of college students from math classes is a major concern to math instructors because missing class appears to increase the drop rate. Suppose that a study was done to determine if the actual student absenteeism rate follows faculty perception. The faculty expected that a group of 100 students would miss class according to Table 11.1.

Number of absences per term	Expected number of students
0–2	50
3–5	30
6–8	12
9–11	6
12+	2

A random survey across all mathematics courses was then done to determine the actual number **(observed)** of absences in a course. The chart in Table 11.2 displays the results of that survey.

Number of absences per term	Actual number of students
0–2	35
3–5	40
6–8	20
9–11	1
12+	4

Table 11.2

Conduct a χ^2 GOF test to test the claim if the actual student absenteeism rate follows faculty perception.

You'll need a Ho and H1, Test statistic, p-value , a decision about Ho and restate that decision in the context of the claim. See next page

Q3 Claim: Teachers think students spread their work out through out the week.

Observed	Expected
11	8
8	8
10	8
7	8
10	8
5	8
5	8

56 / 7 nights

Claim

H_0: HW is spread out over the week

H_1: H_0 is false

6 DF $\chi^2 = 4.5$

P-value 0.609

Fail to reject H_0:

See Quiz Sheet for conclusion

Type 2: Equally Likely:

Teachers want to know which night each week their students are doing most of their homework. Most teachers think that students do homework equally throughout the week. Suppose a random sample of 56 students were asked on which night of the week they did the most homework. The results were distributed as in

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Number of Students	11	8	10	7	10	5	5

From the population of students, do the nights for the highest number of students doing most of their homework occur with equal frequencies during a week?

You'll need a Ho and H1, Test statistic, p-value , a decision about Ho and restate that decision in the context of the claim.

Conclusion Boilerplate

If the alternative hypothesis supports the claim:

- Reject H_0: The data supports the claim that ...
- Fail to reject H_0: There is not enough data to support the claim that ...

If the null hypothesis supports the claim:

- Reject H_0: There is enough data to justify rejection of the claim that ...
- Fail to reject H_0: There is not enough data to justify rejection of the claim that...

There is not enough data to support the claim that students spread their work out over the week.

Some travel agents claim that honeymoon hot spots vary according to age of the bride. Suppose that 280 recent brides were interviewed as to where they spent their honeymoons. The information is given in Table 11.46. Conduct a test of independence.

Location	20–29	30–39	40–49	50 and over
Niagara Falls	15	25	25	20
Poconos	15	25	25	10
Europe	10	25	15	5
Virgin Islands	20	25	15	5

Table 11.46

You'll need to restate the claim, a Ho and H1, Test statistic, p-value , a decision about Ho and restate that decision in the context of the claim.

Conclusion Boilerplate

If the alternative hypothesis supports the claim:

- Reject H_0: The data supports the claim that ...
- Fail to reject H_0: There is not enough data to support the claim that ...

If the null hypothesis supports the claim:

- Reject H_0: There is enough data to justify rejection of the claim that ...
- Fail to reject H_0: There is not enough data to justify rejection of the claim that...

χ^2 Test For independence

Claim: There is an association between the age of a bride and the location of the honeymoon.

H_0: No association between age & location

Claim H_1: Its False

Data in a 4x4 matrix STAT TEST

(Q4)

STAT : Test : χ^2-Test

$\chi^2 = 15.7$

P-value 0.0734

Fail to reject H_0

There is <u>not</u> enough data to support the claim that age & honeymoon location are dependent.

Are the means for the final exams the same for all statistics class delivery types? Table 13.25 shows the scores on final exams from several randomly selected classes that used the different delivery types.

Online	Hybrid	Face-to-Face
72	83	80
84	73	78
77	84	84
80	81	81
81		86
		79
		82

Table 13.25

Assume that all distributions are normal, the four population standard deviations are approximately the same, and the data were collected independently and randomly. Use a level of significance of 0.05.

Here is computer output:

Anova: Single Factor

SUMMARY

Groups	Count	Sum	Average	Variance
Online	7	555	79.28571	15.2381
Hybrid	4	321	80.25	24.91667
Face-to-Fa	5	409	81.8	10.2

ANOVA

Source of '	SS	df	MS	F	P-value	F crit
Between C	18.45893	2	9.229464	0.579688	0.573912	3.805565
Within Grc	206.9786	13	15.92143			
Total	225.4375	15				

Continued on the next page

See next page

You'll need a Ho and H1, Test statistic, p-value , a decision about Ho and restate that decision in the context of the claim.

Conclusion Boilerplate

If the alternative hypothesis supports the claim:

- Reject H_0: The data supports the claim that ...
- Fail to reject H_0: There is not enough data to support the claim that ...

If the null hypothesis supports the claim:

- Reject H_0: There is enough data to justify rejection of the claim that ...
- Fail to reject H_0: There is not enough data to justify rejection of the claim that...

Claim: Final exam averages are equal across the three class formats

H_0: $\mu_{online} = \mu_{Hybrid} = \mu_{F2F}$ Claim

H_1: H_0 is False

$F_{STAT} = 0,5797$

P-value $= 0,5739$

Fail to reject H_0

There is not enough data to justify the rejection of the claim that Exam averages are the same across the different format types.

Answers to Spring 2026 (ID: 1)

1) $m\angle B = 69.4°$, $m\angle A = 20.6°$, $c = 8.5$

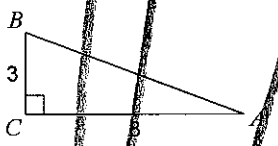
2) $m\angle A = 56°$, $b = 2.6$, $a = 3.9$

3) $m\angle B = 66.8°$, $a = 6.4$, $c = 16.3$

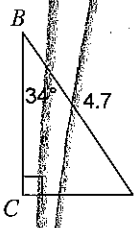
Spring 2026

Solve each triangle. Round answers to the nearest tenth.

1)



2)



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