STAT 131-02 — Discussion (Week 1)

STAT 131: First-week essentials

Start here each week	Watch the **two weekly lecture units** ⟶ complete the **lecture assessments on time** ⟶ come to **Thursday lecture** ⟶ **Friday discussion** ready to ask questions and practice.
Where to be	Lecture discussion: Thu 11:40am–1:15pm, PhysSciences 110. Discussion section: Fri 1:20pm–2:25pm, Kresge Academy 3101.
Check these platforms	Canvas: materials, updates, logistics. Ed Discussion: questions about content and course logistics. GradeScope: submit in-class and DS activities by the end of class.
What is graded	**Lecture attendance is graded**. Some Thursdays and Fridays also include graded activities. Weekly work + participation = **47.5%** of the course grade. Midterm + final = **52.5%** of the course grade.
Built-in flexibility	The course drops **one** homework, **one** quiz, **one** in-class activity, and **one** DS activity. Use this as your emergency buffer.
Non-negotiables	**No late** lecture assessments or homework. **No make-up** quizzes or activities. Homework must be **handwritten**. **No AI** on graded work.
Major dates	Midterm: Thu May 7. Final: Tue Jun 9.

Contact, office hours, and course support

Instructor	Raquel Prado	rprado@ucsc.edu Thu 3:00–4:00pm (at **E2 521**) Wed 1:30–2:30pm (by appointment)
TA	Antonio Aguirre	jaguir26@ucsc.edu Thu 1:30–2:30pm (at **S&E Library Room 332**)
Extra Material	antonio-aguirre.com	Check my STAT131 material.

Math assessment: main topics and key formulas

The readiness assessment is checking a short list of core tools. Focus on *showing work clearly* and *using the right notation*.

1. Summation notation.

$$\sum_{k=1}^{n} k = \frac{n(n+1)}{2}.$$

2. Basic derivatives.

$$\frac{d}{dx} e^{ax} = ae^{ax}, \qquad \frac{d}{dx} \ln(u(x)) = \frac{u'(x)}{u(x)}.$$

3. Infinite geometric series.

$$\sum_{k=0}^{\infty} r^k = \frac{1}{1-r}, \qquad |r| < 1.$$

4. Partial derivatives. Treat the other variable as constant. For example,

$$\frac{\partial}{\partial x}(x^3 y^2) = 3x^2 y^2.$$

5. Integration by parts.

$$\int u\, dv = uv - \int v\, du.$$

6. Taylor series of e^x at 0.

$$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots$$

so the first three nonzero terms are

$$1 + x + \frac{x^2}{2}.$$

7. Double integrals and regions. Before integrating or reversing order, read the region from the bounds. For

$$\int_0^1 \int_0^x (\cdots)\, dy\, dx,$$

the region is

$$0 \le y \le x \le 1.$$

Common pitfalls. Forgetting the domain of $\ln(x^2)$, using the geometric-series formula when $|r| \ge 1$, skipping factorials in the Taylor series, or changing the order of integration without sketching the region.

Week 1 DS review problems

Problem 1. Summation notation. Evaluate $\sum_{k=1}^{15} k$.

Problem 2. Basic derivatives. Compute: (a) $\dfrac{d}{dx}(e^{-4x})$; (b) $\dfrac{d}{dx}(\ln(x^2))$, and state where your answer is valid.

Problem 3. Infinite geometric series. Evaluate $\sum_{k=0}^{\infty}(1/5)^k$, and state briefly why the formula applies.

Problem 4. Partial derivatives. Let $f(x, y) = x^2y^3$. Compute $\dfrac{\partial f}{\partial x}$ and $\dfrac{\partial f}{\partial y}$.

Problem 5. Integration by parts. Evaluate $\int_1^e x\ln(x)\,\mathrm{d}x$. Clearly identify your choices of u and dv.

Problem 6. Taylor series. Write the first four nonzero terms of the Taylor series of e^x centered at $x = 0$.

Problem 7. Double integral and change of order. Consider

$$I = \int_0^1 \int_0^x (2x + y)\,dy\,dx.$$

(a) Sketch the region of integration and label the boundary lines.

(b) Evaluate the integral as written.

(c) Rewrite the integral with the order of integration reversed; you do not need to evaluate the reversed version.