Please read the following instructions carefully:

- There are **seven problems** in this exam.
- There is **one bonus** problem.
- You have **90 minutes** to complete the exam
- The point distribution is given in the table below.
- Please write each solution on a separate page.
- You **must have your camera on** during the exam.
- This is a **closed book, closed notes exam**. You must not consult any resource while attempting the exam.
- Upload your work to Gradescope.
- Submitting the exam implies you abide by the honor pledge stated below:

> *I pledge on my honor that I have not given or received any unauthorized assistance on this quiz/examination*

- **Here are some formulas/identities you may find useful:**

$$\int \tan(x)\,dx = -\ln|\cos x| + C, \qquad \int \sec\theta\,d\theta = \ln|\sec\theta + \tan\theta| + C \qquad 1 + \tan^2(x) = \sec^2(x)$$

Question:	1	2	3	4	5	6	7	8	Total
Points:	10	10	10	10	10	10	10	0	70

1. (10 points) Compute the following integral:

$$\int x \tan^2(x)\, dx$$

2. (10 points) Compute the following integral:

$$\int e^{3x} \cos(x)\, dx$$

3. (10 points) Compute the following integral:

$$\int \tan^6(x) \sec^4(x)\, dx.$$

4. (10 points) Compute the following integral:

$$\int \frac{dx}{(4-x^2)^{\frac{3}{2}}}$$

5. (10 points) Compute the following integral:

$$\int \frac{2x+3}{x(x-3)(x+3)}\, dx.$$

6. (10 points) Write an approximation using the trapezoidal rule for the integral,

$$\int_0^4 e^{x^3}\, dx,$$

using $n = 4$ sub-intervals. **Do NOT find the final numerical answer.**

7. Determine whether the following improper integrals converge:

   (a) (5 points)

$$\int_1^\infty \frac{\sqrt{x+1}}{x}\, dx$$

   (b) (5 points)

$$\int_1^\infty \frac{\ln x}{x^3}\, dx$$

8. (5 points (bonus)) In class we argued that integration by parts can be used to compute reduction formulas for some integrals. Can you compute the reduction formula for

$$I_n = \int e^{ax} \sin^n(x)\, dx\ ?$$