

Instructions: Please put everything away and no calculators are permitted on this exam. Legibly print your full name on each answer sheet, and write and sign the honor pledge on the first page. Write your solutions neatly on the answer sheets, doing problem 1 on the first page, problem 2 on the second page, and so on. Continue your work onto the back of the page, if necessary. When you have finished, arrange the answer sheets in order and turn them in to your TA.

(1) (10 points) Evaluate the integral.

$$\int \sin^5 x \cos^4 x \, dx$$

(2) (15 points) Evaluate the integral.

$$\int \frac{1}{(1-9x^2)^{3/2}} \, dx$$

(3) (15 points) Evaluate the integral.

$$\int \frac{2x+3}{x^3+3x} \, dx$$

(4) Determine whether the improper integral converges. If it does, determine the value of the integral.

(a) (15 points)

$$\int_0^1 \frac{e^x}{\sqrt{e^x-1}} \, dx$$

(b) (15 points)

$$\int_2^\infty x e^{-2x+3} \, dx$$

(5) (a) (15 points) Find an upper bound

$$E_n^T \leq \frac{K_T}{12n^2}(b-a)^3$$

for the error E_n^T in approximating the integral

$$\int_0^1 e^{x^2} \, dx$$

by the trapezoidal rule with $n = 10$ subintervals.

(b) (15 points) Let

$$f(x) = 1 + e^{-x}.$$

Find the third Taylor polynomial $p_3(x)$ of f.