

Sample Midterm One
Brendan Owens, 1552

Name: _____

[1] 25	[2] 25	[3] 25	[4] 25	TOTAL

Please leave these boxes blank!

There are 4 problems on this exam. Each problem is worth 25 points, for a total of 100 points. You must show **all** your work to receive credit. **Important: No books, calculators, or notes are allowed.** Please read each question carefully, show all work, and check afterwards that you have answered all of each question correctly. Write **one** clear answer with a coherent derivation. Good luck!

Trig identities:

$$\begin{aligned} \sin^2 \theta + \cos^2 \theta &= 1 \\ \cos^2 \theta &= \frac{1 + \cos(2\theta)}{2} \\ \sin^2 \theta &= \frac{1 - \cos(2\theta)}{2} \end{aligned}$$

Numerical integration formulas:

$$\begin{aligned} T_n &= \frac{b-a}{2n} (f(x_0) + 2f(x_1) + \cdots + 2f(x_{n-1}) + f(x_n)) \\ \text{Error}(T_n) &\leq \frac{K(b-a)^3}{12n^2} \end{aligned}$$

Trig sub table:

Integral contains	Substitute	Use
$\sqrt{a^2 - x^2}$	$x = a \sin \theta$ ($\theta = \sin^{-1} \frac{x}{a}$)	$\sqrt{a^2 - x^2} = a \cos \theta$
$\sqrt{a^2 + x^2}$ (or $a^2 + x^2$)	$x = a \tan \theta$ ($\theta = \tan^{-1} \frac{x}{a}$)	$\sqrt{a^2 + x^2} = a \sec \theta$
$\sqrt{x^2 - a^2}$	$x = a \sec \theta$ ($\theta = \sec^{-1} \frac{x}{a}$)	$\sqrt{x^2 - a^2} = a \tan \theta$

[2] Use integration by parts to find

$$\int e^x \cos x dx$$

[2] (25 pts)

Please leave blank!

[3] Evaluate the following integrals.

(a)

$$\int_{-\pi/2}^{\pi/2} \sin^4 x \cos^3 x \, dx$$

(b)

$$\int \sec x \, dx$$

[3] (25 pts)

Please leave blank!

[4] Evaluate the integral.

$$\int_2^3 \frac{1}{x^2 - 1} dx$$

[4] (25 pts)

Please leave blank!