

Calculus II - Test #2

Professor Broughton

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Name: _____

Box # _____

Instructions

- Answer all the questions directly on the test.
- For this test use only pencil/pen.
- Show all the necessary work and write your answers out neatly in English sentences.
- Make reasonable simplifications.

Question	Possible Points	Points Obtained
1	40	
2	20	
3	20	
4	20	
Total	100	

1. Integrals

1 Compute the following definite integrals.

1. $\int_0^2 \frac{dx}{\sqrt{4-x^2}} =$

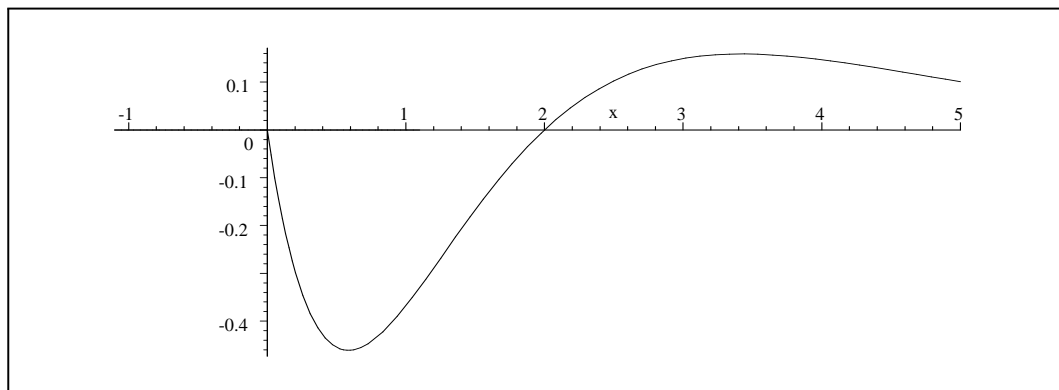
2. $\int_0^T t^2 e^{-3t} dt =$

3. $\int \frac{x+1}{x^2+3x-10} dx =$

4. $\int_0^5 \frac{du}{25+u^2} =$

2. Areas

1. Setup the integral to calculate the area enclosed by the x -axis and curve $y = (x^2 - 2x) \exp(-x)$



2. Compute the integral

3. Hyperbolic functions

1. Demonstrate the following identity by changing to exponentials and expanding:

$$\cosh^2 x - \sinh^2 = 1.$$

2. Compute $\int_0^1 u \sinh u^2 du$

4. Vibrational Energy

Let $f(t)$ be a function defined for $0 \leq t \leq 2\pi$. The strengths of the vibrational energies associated to frequency n are given by:

$$a_n = \frac{1}{\pi} \int_0^{2\pi} f(t) \cos(nt) dt$$
$$b_n = \frac{1}{\pi} \int_0^{2\pi} f(t) \sin(nt) dt$$

Compute a_n for $f(t) = t$, using integration by parts