

First Name: _____ Last Name: _____

Student-No: _____ Section: _____

Grade:

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Indefinite Integrals

1. 9 marks Each part is worth 3 marks. Please write your answers in the boxes.

(a) Calculate the indefinite integral $\int e^{-2x} \sqrt{1 + 2e^{-2x}} dx$.

Answer:

(b) Calculate the indefinite integral $\int (x + 1)e^{-x} dx$ for $x > 0$.

Answer:

(c) (A Little Harder): Calculate the indefinite integral $\int \tan^5(x) \sec^3(x) dx$.

Answer:

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Definite Integrals

2. 12 marks Each part is worth 4 marks. Please write your answers in the boxes.

(a) Calculate $I = \int_0^{\pi/8} \sin^2(2x) dx$.

Answer:

(b) Calculate $I = \int_1^e x^2 \ln x dx$.

Answer:

(c) (A Little Harder): Calculate $I = \int_0^\infty e^{-x} \sin(x) dx$.

Answer:

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Riemann Sum, FTC, and Volumes

3. 12 marks Each part is worth 4 marks. Please write your answers in the boxes.

(a) Calculate the infinite sum

$$\lim_{n \rightarrow \infty} \sum_{i=1}^n \frac{8i}{n^2} e^{-4i^2/n^2}$$

by first writing it as a definite integral. Then, **evaluate this integral**.

Answer:

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- (b) For $x > 0$ define $F(x) = \int_1^x t^{-1/2} dt$ and $g(x) = \sqrt{F(x^2)}$. Calculate $g'(2)$.

Answer:

- (c) Write a definite integral, with specified limits of integration, for the volume obtained by revolving the bounded region between $x = (y - 2)^2$ and $x = 2 - (y - 2)^2$ about the vertical line $x = -2$. **Do not evaluate the integral.**

Answer:

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4. (a) 2 marks Plot the finite area enclosed by $y^2 = 4 - x$ and $x = 3y - 6$.

- (b) 4 marks Write a definite integral with specific limits of integration that determines this area. **Do not evaluate the integral.**

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5. A solid has as its base the region in the xy -plane between $y = 1 - x^2/36$ and the x -axis. The cross-sections of the solid perpendicular to the x -axis are squares.

(a) 4 marks Write a definite integral that determines the volume of the solid.

(b) 2 marks **Evaluate the integral** to find the volume of the solid.

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