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  $\int \frac{\sin(x)}{\sqrt{\cos(x)}} dx$  for  $0 < x < \pi/2$ .

Answer:

(b) Calculate the indefinite interrel $\int_{-\infty}^{\infty} \frac{x+1}{x+1} dx$ for $x > 0$		
(b) Calculate the indefinite integral $\int \frac{1}{x^2+3x} dx$ for $x > 0$ .	(b) Calculate the indefinite integral $\int \frac{x+1}{x^2+3x} dx$ for $x$	c > 0.

(c) (A Little Harder): Calculate the indefinite integral  $\int x^2 e^{-x}\,dx.$ 

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 ∫<sub>0</sub><sup>π/2</sup> cos<sup>3</sup>(x) dx.

Answer:			

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(b) Calculate  $\int_0^3 \frac{9x^2}{x^2+9} \, dx$ .

Answer:			

(c) (A Little Harder): Calculate  $\int_1^{e^2} \frac{\ln x}{x^2} dx$ . 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

$$\lim_{n \to \infty} \sum_{i=1}^{n} \frac{3i^2}{n^3} \sqrt{1 + \frac{i^3}{n^3}}$$

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

Answer:



(b) For  $x \ge 0$  define F(x) and g(x) by  $F(x) = \int_0^x \cos^2(t) dt$  and  $g(x) = xF(x^2)$ . Calculate  $g'(\sqrt{\pi})$ .

Answer:			

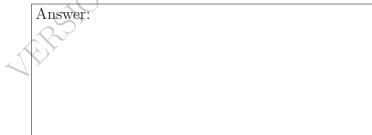
(c) Write a definite integral, with specified limits of integration, for the volume obtained by revolving the bounded region between  $x = -y^2$  and  $x = -4+y^2$  about the vertical line x = 2. Do not evaluate the integral.

Answer:			

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4. (a) 2 marks Plot the finite area enclosed by  $y^2 = x$  and x = 8 - 2y.

(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  $y = 1 x^2/9$  and the x-axis. The cross-sections of the solid perpendicular to the x-axis are semi-circles with the diameter of the semi-circle in the base.
  - (a) 4 marks Write a definite integral that determines the volume of the solid.

Answer:

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

Answer:

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