**Prof. A. Suciu**

**MTH 1108** | **Fundamentals of Integral Calculus** | **Spring 1999**

# QUIZ 3

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**1.** Evaluate the definite integrals: **(9)**

(a) $\displaystyle\int_4^9 \left(\sqrt{x} + \frac{1}{2x}\right) dx =$

(b) $\displaystyle\int_0^{\sqrt{2}} x e^{x^2}\, dx =$

(c) $\displaystyle\int_1^2 \frac{2x+1}{(x^2+x)^3}\, dx =$

**2.** Find the area between the curve $y = (2x+3)^2$ and the $x$-axis, from $x = -2$ to $x = 3$. **(5)**

**3.** Find the area between the curves $y = 4x - 3$ and $y = x^2$. **(6)**

**4.** Let $f(x)$ be a function, with antiderative $F(x) = \int f(x)\,dx$ satisfying $F(1) = 2,\ F(3) = 4$.
Compute: **(6)**

(a) $\int_1^3 f(x)\,dx =$

(b) $\int_0^6 f(x)\,dx + \int_6^0 f(x)\,dx =$

(c) $\int_1^3 2f(x)\,dx - \int_1^3 5f(x)\,dx =$

(d) $\int_1^2 f(x)\,dx + \int_2^3 f(x)\,dx =$

(e) $\int_3^3 \sqrt{f(x)}\,dx =$

**5.** Let $G(x) = \displaystyle\int_2^{x^2} \frac{1}{1+\sqrt{t}}\,dt$. Find $G'(9)$. **(4)**

## Table of Derivatives

$$(fg)' = f'g + fg' \qquad \left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2} \qquad f(g(x))' = f'(g(x)) \cdot g'(x)$$

$$(x^n)' = nx^{n-1} \qquad (e^x)' = e^x \qquad (\ln x)' = \frac{1}{x}$$

$$(\sin x)' = \cos x \qquad (\cos x)' = -\sin x \qquad (\arctan x)' = \frac{1}{x^2+1}$$

## Table of Antiderivatives

$$\int a\,dx = ax + C$$

$$\int x^n\,dx = \frac{x^{n+1}}{n+1} + C \qquad (n \neq -1)$$

$$\int \frac{1}{x}\,dx = \ln|x| + C$$

$$\int e^{ax}\,dx = \frac{1}{a}\,e^{ax} + C \qquad (a \neq 0)$$

$$\int \sin(ax)\,dx = -\frac{1}{a}\,\cos(ax) + C \qquad (a \neq 0)$$

$$\int \cos(ax)\,dx = \frac{1}{a}\,\sin(ax) + C \qquad (a \neq 0)$$

## Properties of Integrals

$$\int (af(x) + bg(x))\,dx = a\int f(x)\,dx + b\int g(x)\,dx$$

$$\int f(g(x))g'(x)\,dx = F(g(x)) + C, \qquad \text{where } F' = f$$

$$\int_a^b f(x)\,dx + \int_b^c f(x)\,dx = \int_a^c f(x)\,dx$$

$$\int_a^b f(t)dt = F(b) - F(a), \qquad \text{where } F' = f$$

$$\frac{d}{dx}\left(\int_a^x f(t)dt\right) = f(x)$$