Prof. A. Suciu

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

QUIZ 1

1. Differentiate:

   (a) $y = 3x^4 - \sin(2x)$ **(3)**

   (b) $y = \dfrac{\ln x}{x^2}$ **(3)**

   (c) $y = e^{\sqrt{x}}$ **(3)**

   (d) $y = (\arctan(x))^2$ **(3)**

2. Compute $f'(2)$, where $f(x) = x^3 g(x)$, $g(2) = 5$, $g'(2) = 6$. **(4)**

3. Compute:

(a) $\displaystyle\int \frac{\cos(3x)}{4}\,dx =$ **(3)**

(b) $\displaystyle\int \left(x^5 + \frac{2}{x} - 3\sqrt{x}\right)\,dx =$ **(3)**

4. Find the functions satisfying

(a) $F'(x) = 3x,\ F(1) = 4$ **(4)**

(b) $F'(x) = e^{-x},\ F(0) = 2$ **(4)**

Table of Derivatives

$$(fg)' = f'g + fg' \qquad \text{(product rule)}$$

$$\left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2} \qquad \text{(quotient rule)}$$

$$f(g(x))' = f'(g(x) \cdot g'(x) \qquad \text{(chain rule)}$$

$$(x^n)' = nx^{n-1}$$
$$(e^x)' = e^x$$
$$(\ln x)' = \frac{1}{x}$$
$$(\sin x)' = \cos x$$
$$(\cos x)' = -\sin x$$
$$(\arctan x)' = \frac{1}{x^2+1}$$

Table of Antiderivatives

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

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

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

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

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

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

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

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