MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

TEST 1 **MATHEMATICS 1001** **October 9, 2002**

NAME:	**Lab Section:**

Marks

[6] 1. (a) Use the definition of the definite integral (as the limit of a sum) to evaluate $\int_{-2}^{2}(x^3 - 3x + 1)\,dx$. Show all steps:

1) $\Delta x =$

2) $x_i =$

3) $f(x_i) =$

4) $\sum_{i=1}^{n} f(x_i)\Delta x =$

5)$\lim_{n\to\infty} \sum_{i=1}^{n} f(x_i)\Delta x =$

[1] (b) Check your answer in 1(a) by using the Fundamental Theorem of Calculus.

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2. Find each of the following integrals.

[3] (a) $\int x\sqrt{9 - 2x^2}\,dx$

[4] (b) $\displaystyle\int_1^e \frac{1}{3x(1+\ln x)}\,dx$

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[3] (c) $\displaystyle\int \frac{\cos\sqrt[4]{t}-\sin\sqrt[4]{t}}{\sqrt[3]{t^4}}\,dt$

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[4] (d) $\displaystyle\int_0^{\pi/4} \tan^5\theta\,\sec^2\theta\,d\theta$

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[4] (e) $\displaystyle\int x^3\sqrt{2x^2-1}\,dx$

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[4] (f) $\displaystyle\int_0^2 |2x-3|)\,dx$

[4] (h) $\int (e^x \csc e^x)\, dx$

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[4] 3. Given $f''(x) = \cos(3x)$ and $f(0) = 0, f(\pi/3) = 11/9$, solve the differential equation, i.e. find $f(x)$.

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[5] 4. For a savings account in which the interest is compounded continuously, find the time to triple an initial investment, assuming the annual rate is 4%.

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[4] 5. Find derivative of the function $F(x)$:

a) $F(x) = \int_0^x \sin(\tan t)\, dt$

b) $F(x) = \int_0^{x^2} \sin(\tan t)\, dt$

c) $F(x) = \int_{x^2}^1 \sin(\tan t)\, dt$