MAC 2311, Section 02, Summer 2004 (Dr M-G)

Mock Fourth Test

Wednesday, August 4, 2004

You are allowed to use a TI-30Xa (or any four-function calculator). No other calculator is allowed. You have one hour. Present your solutions clearly. Show all necessary steps in your method. Include enough comments or diagrams to convince me that you thoroughly understand. Begin each question (as opposed to part of question) on a fresh sheet of paper, use *one* side of the paper only, and ensure that your solutions are stapled together in the proper order at the end of the test.

1. For $y = (1+x^2)\sqrt[3]{2+x^2}$ find the *exact* value of $\left.\dfrac{dy}{dx}\right|_{x=5}$. [10]

2. Use L'Hôpital's rule to calculate $\lim\limits_{x\to 1}\left(\dfrac{1}{\ln(x)} - \dfrac{1}{x-1}\right)$. [10]

3. Use the substitution $u = \sqrt[3]{1+2x}$ to calculate $I = \int\limits_0^{13}\left(\dfrac{1}{20}+x^2\right)\dfrac{1}{\sqrt[3]{1+2x}}\,dx$. [10]

4. The region bounded by the lines $x = 1$, $x = 3$, $y = 0$ and the hyperbola $xy = 1$ is rotated (through angle 2π) about the axis of symmetry $y = -1$. Find the *exact* volume of the solid thus generated

(a) by integrating with respect to x and [8]

(b) by integrating with respect to y. [12]

Note: The correct answer exceeds 8 but does not exceed 9.

[Perfect score: $3 \times 10 + 20 = 50$]