SULTAN QABOOS UNIVERSITY- COLLEGE OF SCIENCE
DEPARTMENT OF MATHEMATICS AND STATISTICS

MATH 2108 – CALCULUS II

TEST 1 - SPRING 2007 - MARCH 20th, 2007

Instructions:

▶ The duration of this exam is 60 minutes and is worth 40 marks.

▶ *Do all problems.* To get full credit: show your work, and mention theorems when appropriate.

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1. [6 marks] Sketch the region enclosed by the curves $y = x^2$and $x + y = 6$. Then find its area.

2. [7 marks] Use cylindrical shells to find the volume of the solid generated when the region bounded by the curves $x = 0$, $y = x$ and $y = \sqrt{4 - x^2}$, is revolved about the y-axis.

3. [7 marks] Find the surface area of the solid generated when the curve $y = \sqrt{2 + x}$ from $x = -1$ to $x = 1$ is revolved about the x-axis.

4. [5 marks] Prove that $\int \sin^k x dx = -\frac{1}{k-1} \sin^{k-1} x + \frac{k-1}{k} \int \sin^{k-2} x dx$.

5. [15 marks] Evaluate the following integrals:

   (a) [4 marks] $\int \tan^5 3x \sec^4 3x \; dx$

   (b) [4 marks] $\int \dfrac{x^2 - 2x}{\sqrt{4 - x^2}} dx$

   (c) [3 marks] $\int_1^2 x^3 \ln x \; dx$

   (d) [4 marks] $\int \dfrac{x^2 - 3x + 4}{(x - 1)(x^2 + 1)}$

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