Math 152, Spring 2008, Review Problems for Midterm 1

Your first exam is likely to have problems that do not resemble these review problems.

(1) Calculate the work done against gravity when a column of height 12 feet and square base of side 2 feet is built out of a material with density 100 pounds per cubic foot.

(2) Find the volume of a sphere of radius R in two different ways: (a) Using the Disk Method. (b) Using the Shells Method.

(3) A triangular region $\mathcal{R}$ is bounded by the lines $x = 2$, $y = 1$, $x + y = 2$. (a) Find the volume of the solid obtained by rotating $\mathcal{R}$ about the x-axis. (b) Find the volume of the solid obtained by rotating $\mathcal{R}$ about the y-axis.

(4) Evaluate $\displaystyle\int \frac{3x^2 + 2x - 1}{(x-1)(x^2+1)}\, dx$.

(5) Evaluate $\displaystyle\int \frac{dx}{x\sqrt{36 - x^2}}$ and $\displaystyle\int \frac{dx}{(9 + x^2)^2}$.

(6) Evaluate $\displaystyle\int_5^7 \frac{dx}{\sqrt{x - 5}}$ and $\displaystyle\int_2^\infty \frac{dx}{(2x - 1)(x - 1)}$.

(7) Evaluate $\displaystyle\int (\ln x)^3\, dx$ and $\displaystyle\int \sec^3 x\, dx$.

(8) Evaluate $\displaystyle\int \tan^4 x \sec^4 x\, dx$ and $\displaystyle\int \tan^3 x \sec^3 x\, dx$.

(9) Evaluate $\displaystyle\int \sec^{-1} x\, dx$.

(10) Find N such that Simpson's Rule with N subintervals approximates $\displaystyle\int_2^{32} \ln x\, dx$ with Error ≤ 0.0001.

(11) Find the integral of $\sin^4 x$ over the interval $[0, \pi/2]$.