Math 1001 **Section 1 (Margo)** **Assignment #2** **Due Sept 25**

1. Evaluate the Riemann sum S_4 for function $f = 1 + x^2$, on the interval $-1 \le x \le 2$, for a regular partition with four subintervals, taking the sample points as the right-hand endpoints of each interval.

2. Evaluate the definite integral by setting an appropriate Riemann sum and evaluating its limit
   (a) $\int_0^2 2x^3\,dx$ (b) $\int_{-2}^1 (2x - x^2)dx$

3. Rewrite the limit as a definite integral and evaluate:

$$\lim_{\|\triangle\|\to 0} \sum_{i=1}^{n} (\sec^2(2c_i))\,\triangle x_i,$$

   where c_i is a point from the interval $\triangle x_i$ $(i = 1, 2, ..., n)$ of the partition of the segment $[\pi/6, \pi/3]$.

4. Evaluate using the Fundamental Theorem of Calculus
   (a) $\displaystyle\int_4^9 \frac{6x-5}{2\sqrt{x}}\,dx$ (b) $\displaystyle\int_{-4}^{-1} \frac{(3x-2)^2}{x^2}\,dx$ (c) $\displaystyle\int_1^2 \frac{6+x^4\sin\pi x}{x^4}\,dx$

   (d) $\displaystyle\int_0^{\frac{1}{3}} \frac{4}{(2t-1)^3}\,dt$ (e) $\displaystyle\int_{\frac{\pi}{6}}^{\frac{\pi}{2}} \csc\theta\,(\csc\theta + \cot\theta)\,d\theta$ (f) $\displaystyle\int_0^{\ln 2} \frac{e^{4x}+1}{e^{2x}}\,dx$

   (g) $\displaystyle\int_{-1}^{0} \frac{3}{5x-4}\,dx$ (h) $\displaystyle\int_0^3 |x^2-4|\,dx$

5. Consider

$$F(x) = \int_4^{3x^2} \sqrt{2t+1}\,dt$$

   Find the derivative $F'(x)$ in two different ways and compare your answers: (a) using the FTC; (b) evaluate the integral and differentiate the result.

6. Find the derivative $F'(x)$ for given function $F(x)$:
   (a) $F(x) = \displaystyle\int_{\sqrt{x}}^{1} \frac{4t^3}{t^2+1}\,dt$ (b) $F(x) = \displaystyle\int_{-x}^{2x} \ln(t^2+2)\,dt$