Term Test C version 1

(1)[5 points] The two curves $y = x$ and $y = x^3$ meet three times; call the three points of intersection A, B, and C, from left to right. Find the area between the two curves between A and C. If part of this area is below the x-axis, make sure to *add* it to the total area and not *subtract* it.

(2)[5 points] Evaluate the following integral.

$$\int_{\frac{\pi}{6}}^{\frac{\pi}{4}} \cos^3 2t \, dt \tag{1}$$

(3)[5 points] Find the following arc length.

$$y = \frac{1}{8}x^4 + \frac{1}{4}x^{-2}, 1 \leq x \leq 2 \tag{2}$$

(4)[5 points] Use integration by parts to find the following integral. Remember that you can find the antiderivative of $f(x) = \ln x$ by writing $f(x) = \ln x \cdot 1$ and then integrating by parts.

$$\int (\ln x)^2 \, dx \tag{3}$$

(5)[5 points] Find the length of the following curve.

$$x = \int_0^y \sqrt{\sec^4 t - 1}, dt, -\frac{\pi}{3} \leq y \leq \frac{\pi}{3} \tag{4}$$

(6)[5 points] S is a solid generated by revolving a bounded region R about the x-axis. Find the volume of S. R is bounded by the lines $y = 0$, $x = \pi/6$, $x = \pi/4$, and the curve $y = \cos x$.

(7)[5 points] Find the area of the surface generated by revolving about the y-axis the arc C given by

$$x = 2\sqrt{\frac{y}{3}}, 1 \leq y \leq 2 \tag{5}$$