Practice problems for 6.3, 6.4 and 8.1

1. Find the length of the curves
a. (6.3.31 Adapted)$x = \int_{.1}^{y} \sqrt{\csc^4 t - 1}dt$, $\frac{\pi}{4} \leq y \leq \frac{3\pi}{4}$
What happens if we change the interval to $-\frac{\pi}{4} \leq y \leq \frac{\pi}{4}$?

b. (11.2.29)$x = 8\cos t + 8t\sin t$; $y = 8\sin t - 8t\cos t$, $0 \leq t \leq \frac{\pi}{2}$

2. Find the area of the surface generated by revolving the following curve around the indicated axis
a. (6.4.17) $x = \frac{y^3}{3}$, $0 \leq y \leq 1$, y-axis

b. (6.4.22)$y = (1/3)(x^2 + 2)^{3/2}$, $0 \leq x \leq \sqrt{2}$, y-axis

3. Show that the curve in 1b does not cut the x-axis for $0 < t < \frac{\pi}{2}$.
a. Set up the integral to find the area of the surface generated by revolving that curve around the x-axis.

b. Calculate that integral.

4.(8.1.41)Calculate $\int \sin 3x \cos 2x dx$

5. Derive the formula $\int f^{-1}(x)dx = xf^{-1}(x) - \int f(y)dy$ (f^{-1} means inverse)