MATH 230 NAME:
8.2

Directions: Show all work on a separate sheet of paper for full credit.

1. Set up an integral for the area of the surface obtained by rotating the curve around (i) the x-axis and (ii) the y-axis.

   (a) $y = \tan(x)$, $0 \leq x \leq \pi/3$ $\int_0^{\pi/3} 2\pi \tan(x)\sqrt{1+\sec^4(x)}\,dx$ $\int_0^{\pi/3} 2\pi x\sqrt{1+\sec^4(x)}\,dx$

   (b) $y = e^{-x^2}$, $-1 \leq x \leq 1$ $\int_{-1}^{1} 2\pi e^{-x^2}\sqrt{1+4x^2e^{-2x^2}}\,dx$

   (c) $x = \ln(2y+1)$, $0 \leq y \leq 1$ $\int_0^1 2\pi y\sqrt{1+4/(2y+1)^2}\,dy$ $\int_0^1 2\pi \ln(2y+1)\sqrt{1+4/(2y+1)^2}\,dy$

   (d) $y = \tan^{-1}(x)$, $0 \leq x \leq 2$ $\int_0^2 2\pi \tan^{-1}(x)\sqrt{1+1/(1+x^2)^2}\,dx$ $\int_0^2 2\pi x\sqrt{1+1/(1+x^2)^2}\,dx$

2. Find the exact area of the surface obtained by rotating the curve around the given axix.

   (a) $y = x^3$, $0 \leq x \leq 2$, around the x-axis. $\frac{\pi}{27}\left(145^{3/2} - 1\right)$

   (b) $y = \dfrac{1}{3}x^{3/2}$, $0 \leq x \leq 12$, around the y-axis. $\dfrac{3712\pi}{15}$
   Hint: Use the u-sub $u = 1 + \frac{1}{4}x$. You will also need to use $x = 4u - 4$) to get rid of the remaining x.