1. Find the area of the surface obtained by rotating the curve about the y-axis.

$$y=\frac{1}{4}x^2-\frac{1}{2}\ln x, \quad 1\le x\le 2$$

$10\pi/3$

2. Find the area of the surface obtained by rotating the curve about the x-axis.

$$x=\frac{1}{3}\left(y^2+2\right)^{3/2}, \quad 1\le y\le 3$$

48π

3. If the infinite curve $y=e^{-x}, \ x\ge 0$, is rotated about the *x*-axis , find the area of the resulting surface.

$$\pi\left[\sqrt{2}+\ln\left(1+\sqrt{2}\right)\right]$$

4. Find the area of the surface obtained by rotating the curve about the *x*-axis.

$$y=x^3, \ 0\le x\le 3$$

$$\frac{\pi}{27}\left(730\sqrt{730}-1\right)$$

5. Find the area of the surface obtained by rotating the curve about the *x*-axis.

$$x=\frac{1}{2\sqrt{2}}\left(y^2-\ln y\right), \quad 1\le y\le 2$$

$$\frac{\pi}{8}\left(21-8\ln 2-(\ln 2)^2\right)$$

6. Let *L* be the length of the curve $y=f(x), \ a\le x\le u$, where *f* is positive and has a continuous derivative. Let S_f be the surface area generated by rotating the curve about the *x*-axis. If *c* is a positive constant, define $g(x)=f(x)+c$ and let S_g be the corresponding surface area generated by the curve $y=g(x), \ a\le x\le u$. Express S_g in terms of S_f and *L*.

$$S_g=S_f+2\pi cL$$

7. If the curve $y=f(x), \ w\le x\le u,$ is rotated about the horizontal line $y=r$, where $f(x)\le r,$ find a formula for the area of the resulting surface.

$$\int_w^u 2\pi\left(r-f(x)\right)\sqrt{1+\left(\frac{df(x)}{dx}\right)^2}\ dx$$