The curve \( y = f(x), \ a \leq x \leq b \) is rotated around the \textbf{x-axis} to form a surface. The area of this surface is:

\[ S = \]

The curve \( y = f(x), \ a \leq x \leq b \) is rotated around the \textbf{y-axis} to form a surface. The area of this surface is:

\[ S = \]

1. The curve \( y = \sqrt{r^2 - x^2}, \ -r \leq x \leq r \) is a half-circle of radius \( r \). Rotating this curve around the \textbf{x-axis} gives a sphere. Find the surface area of a sphere of radius \( r \).
2. Find the area of the surface obtained by rotating \( y = \sqrt{5 - x}, \ 3 \leq x \leq 5 \) about the \( x \)-axis.

3. Find the area of the surface obtained by rotating \( y = \sin x, \ 0 \leq x \leq \pi/2 \) around the \( x \)-axis.
4. Find the area of the surface obtained by rotating \( y = \frac{1}{4}x^2 - \frac{1}{2}\ln x, \ 1 \leq x \leq 2 \) around the \( y \)-axis.

If a curve given as \( x = g(y), \ c \leq y \leq d \) is rotated around the \( x \)-axis, the formula for surface area is

\[
S = \int_c^d 2\pi y \sqrt{1 + (g'(y))^2} \, dy
\]

5. Find the area of the surface obtained by rotating \( x = 1 + 2y^2, \ 1 \leq y \leq 2 \) around the \( x \)-axis.