1. Do not solve the integral expression. Simplify your result.

\[ \int \frac{x^2}{\sqrt{4-x^2}} \, dx \]

2. Find the area of the region bounded between the curves \( y = x^2 \) and \( y = 4 - x^2 \).

\[ A = \int_{-2}^{2} (4 - x^2) - x^2 \, dx \]

\[ A = \int_{-2}^{2} 4 - 2x^2 \, dx \]

\[ = \left[ \frac{8}{3} x^3 - \frac{4}{3} x^3 \right]_{-2}^{2} \]

\[ = \frac{32}{3} \cdot 2 \cdot \frac{1}{3} \]

\[ = \frac{32}{3} \cdot \frac{2}{3} \]

\[ = \frac{64}{9} \]
6. A pool is being made in a rectangular yard. The
swimmer wants it to be 6 ft. below the water so it has the shape:
Find the horsepower on the dam.

\[ F = 62 \times 10^{-3} \left[ \frac{1}{2} \left( a^2 + b^2 \right) \right] \]
\[ = 62 \left( a^2 + b^2 \right) \]
\[ = \left( a^2 \times b^2 \right) \left( \frac{1}{2} - \frac{1}{2} \right) \]
\[ = 72 \text{ ft.} 

4. The pump is a water wheel with a radius of 6 ft. The
power of the wheel is to be used to raise the water. Find the
work done in lifting the water.

\[ W = 62 \times 10^{-3} \left( (2 + 2) \times (2 + 2) \right) \]
\[ = 1.55 \times 10^{3} \times 1.14 \]
\[ = 1.80 \times 10^{3} \text{ ft.-ft.} \]
4. (a) Find the area of the region bounded by the graphs of $y = \sqrt{x}$, $y = 2$, and $x = 0$.

\[ A = \int_{0}^{2} (2 - \sqrt{x}) \, dx \]

(b) Find the volume of the solid obtained by rotating the region bounded by the graphs of $y = \sqrt{x}$, $y = 2$, and $x = 0$ about the x-axis.

\[ V = \pi \int_{0}^{2} (2^2 - \sqrt{x}^2) \, dx \]

(c) Find the volume of the solid obtained by rotating the region bounded by the graphs of $y = \sqrt{x}$, $y = 2$, and $x = 0$ about the y-axis.

\[ V = \pi \int_{0}^{2} \left( \frac{2^2}{x} \right) \, dx \]