

2.82
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$$V = \pi \int_1^2 \left(\left(\frac{x^2-1}{x^3} \right)^2 dx - \pi \int_1^2 \left(\frac{1}{x} - \frac{1}{x^2} \right)^2 dx - \pi \int_1^2 \left(\frac{1}{x^2} - \frac{2}{x^4} + \frac{1}{x^6} \right) dx \right) dx = \left[-\frac{1}{x} + \frac{2}{2x^2} - \frac{1}{5x^5} \right]_1^2 = \left(-\frac{1}{2} + \frac{2}{2 \cdot 4} - \frac{1}{5 \cdot 32} \right) - \left(-1 + \frac{2}{2} - \frac{1}{5} \right) = \frac{-240 + 40 - 3 + 480 - 320 + 96}{480} \pi = \frac{53}{480} \pi$$