A2Q8

Gabriel's horn is the surface of revolution that you obtain by rotating $f(x) = \frac{1}{x}$ about the x axis for $x \geq 1$.

The calculus question is to compute the volume of Gabriel's horn on $[1, \infty]$ using an improper integral. Do this in Maple. It's one of those integrals that has a "nice" answer.

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> restart:
> f := Pi*(1/x)^2;
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$$f := \frac{\pi}{x^2} \tag{1}$$

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> V := int(f,x=1..infinity);
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$$V := \pi \tag{2}$$

The volume is equal to the integral of the area of the disc times the height, and the area of a disc is Pi*r^2, where r=1/x. We also take the height to be infinitely long, and obtain a volume of Pi.