

# QUIZ 7

Time: 15min

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1. Show that the surface  $z = 1/\sqrt{x^2 + y^2}$ , where  $1 \leq x \leq \infty$ , has finite volume but infinite surface area.

*Hints:*

- (i) Use Cavalieri's principle to compute the volume.
- (ii) To find the surface area recall that if the graph of the curve  $z = f(x)$  is rotated around the  $x$ -axis, then the area is given by  $\int_a^b |f(x)|\sqrt{1 + [f'(x)]^2}dx$ .

**Bonus:** Derive the formula for the surface area mentioned above (*Hint:* Use the parametrization  $\Phi(x, \theta) := (x, \sin \theta f(x), \cos \theta f(x))$ ).

*The problem is worth 10 points, and the bonus is worth 5 points.*