

# Problem for 1996 February

Proposed by Dan Jurca

There is a nonconstant function  $f:\mathbf{R}\rightarrow\mathbf{R}$  such that

i.

$$f(0)=2;$$

ii.

$f$  is continuously differentiable;

iii.

for each positive  $X$  if  $S_X$  is the solid obtained by revolving about the  $x$ -axis the region bounded by the  $x$ -axis, the graph of  $f$ , and the vertical lines  $x=0$  and  $x=X$ , then the surface area of  $S_X$  (excluding the circular "ends") equals the volume of  $S_X$ .

Find  $f$ .