

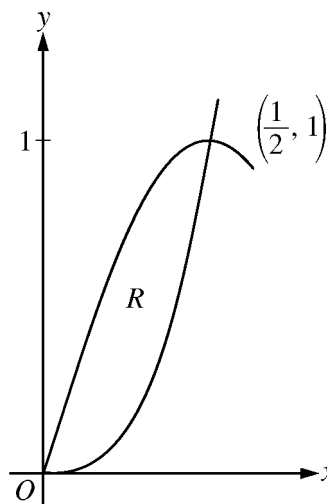
2011 AP<sup>®</sup> CALCULUS AB FREE-RESPONSE QUESTIONS

CALCULUS AB  
SECTION II, Part B

Time—60 minutes

Number of problems—4

No calculator is allowed for these problems.



3. Let  $R$  be the region in the first quadrant enclosed by the graphs of  $f(x) = 8x^3$  and  $g(x) = \sin(\pi x)$ , as shown in the figure above.
- (a) Write an equation for the line tangent to the graph of  $f$  at  $x = \frac{1}{2}$ .
  - (b) Find the area of  $R$ .
  - (c) Write, but do not evaluate, an integral expression for the volume of the solid generated when  $R$  is rotated about the horizontal line  $y = 1$ .

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WRITE ALL WORK IN THE EXAM BOOKLET.