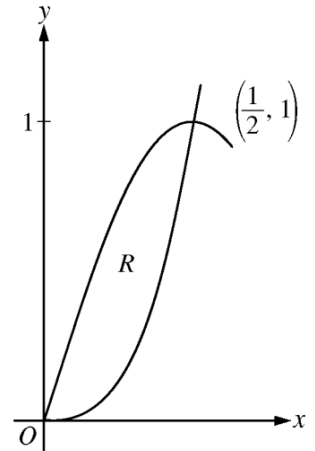


Directions: Complete each Free Response Question on the FRQ Planning/Solution Template.

1)

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  $y = 1$ .



2)

Let  $g$  be the piecewise-linear function defined on  $[-2\pi, 4\pi]$  whose graph is given above, and let  $f(x) = g(x) - \cos\left(\frac{x}{2}\right)$ .

- (a) Find  $\int_{-2\pi}^{4\pi} f(x) dx$ . Show the computations that lead to your answer.
- (b) Find all  $x$ -values in the open interval  $(-2\pi, 4\pi)$  for which  $f$  has a critical point.
- (c) Let  $h(x) = \int_0^{3x} g(t) dt$ . Find  $h'\left(-\frac{\pi}{3}\right)$ .

