

# 2002 AP<sup>®</sup> CALCULUS AB FREE-RESPONSE QUESTIONS

## CALCULUS AB SECTION II, Part A

Time—45 minutes

Number of problems—3

A graphing calculator is required for some problems or parts of problems.

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1. Let  $f$  and  $g$  be the functions given by  $f(x) = e^x$  and  $g(x) = \ln x$ .
- (a) Find the area of the region enclosed by the graphs of  $f$  and  $g$  between  $x = \frac{1}{2}$  and  $x = 1$ .
- (b) Find the volume of the solid generated when the region enclosed by the graphs of  $f$  and  $g$  between  $x = \frac{1}{2}$  and  $x = 1$  is revolved about the line  $y = 4$ .
- (c) Let  $h$  be the function given by  $h(x) = f(x) - g(x)$ . Find the absolute minimum value of  $h(x)$  on the closed interval  $\frac{1}{2} \leq x \leq 1$ , and find the absolute maximum value of  $h(x)$  on the closed interval  $\frac{1}{2} \leq x \leq 1$ . Show the analysis that leads to your answers.
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