

**Data with  $f$ ,  $f'$ ,  $g$ ,  $g'$** *AP Calculus*

Try to do this problem in 15 minutes. Show clear work. Remember: If you use one of the “existence theorems” (such as MVT, IVT, EVT) you MUST state the preconditions (such as differentiability and/or continuity).

$x$	-2	$-2 < x < -1$	-1	$-1 < x < 1$	1	$1 < x < 3$	3
$f(x)$	12	Positive	8	Positive	2	Positive	7
$f'(x)$	-5	Negative	0	Negative	0	Positive	$\frac{1}{2}$
$g(x)$	-1	Negative	0	Positive	3	Positive	1
$g'(x)$	2	Positive	$\frac{3}{2}$	Positive	0	Negative	-2

The twice-differentiable functions  $f$  and  $g$  are defined for all real numbers  $x$ . Values of  $f$ ,  $f'$ ,  $g$ , and  $g'$  for various values of  $x$  are given in the table above.

- (a) Find the  $x$ -coordinate of each relative minimum of  $f$  on the interval  $[-2, 3]$ . Justify your answers.
- (b) Explain why there must be a value  $c$ , for  $-1 < c < 1$ , such that  $f''(c) = 0$ .
- (c) The function  $h$  is defined by  $h(x) = \ln(f(x))$ . Find  $h'(3)$ . Show the computations that lead to your answer.
- (d) Evaluate  $\int_{-2}^3 f'(g(x))g'(x) dx$ .

