4.1 Absolute Min/Max

Find abs. min/max values for

$f(x) = \frac{9}{x} + x - 3$ on $[1, 9]$

Poll choices:

A) Abs. min at $x = 3$

B) Abs. min. at $x = 1$

C) Abs. min at $x = 9$

D) Abs. min at $x = 0$

E) Abs. min at $x = -3$

Step 1 $f(x)$ is NOT continuous at $x=0$
however, 0 is not in $[1,9]$

$f(x) = 9\cdot x^{-1} + x - 3$

$f'(x) = -9x^{-2} + 1$

critical p. $\rightarrow$ $f'(x)=0$ or DNE

$f'(x)=0 \Rightarrow \frac{-9}{x^2} + 1 = 0 \Rightarrow \frac{-9}{x^2} = -1 \Rightarrow 9 = x^2$

$x=3$ $x=-3$ not in $[1,9]$

only $x=3$ is a crit. P

$f'(x)$ DNE : $x=0$, however, as stated before
$x=0$ is NOT in $[1,9]$

endpoints: $x=1, 9$

Step 2

	x	$f(x) = \frac{9}{x} + x - 3$	
critical P	3	$f(3) = \frac{9}{3} + 3 - 3 = 3$	MIN
endpoints	1	$f(1) = 9 + 1 - 3 = 7$	MAX
	9	$f(9) = \frac{9}{9} + 9 - 3 = 7$	MAX

The absolute max. is 7, the abs. max points are: (1,7) and (9,7).

(It's OK that the abs. max. values occur at multiple x-values)

The abs. min. is 3, the abs. min point is: (3,3)