Date	Name	Grade / Score
		/15

1.   Let $\{a_n\}$ and $\{b_n\}$ be two sequences.

   (a)   Give a counter example to verify that the following statement may not be true.
       "If $\lim\limits_{n\to\infty} a_n$ and $\lim\limits_{n\to\infty} b_n$ do not exist then $\lim\limits_{n\to\infty} a_n b_n$ does not exist."

   (b)   Prove that if $\lim\limits_{n\to\infty} a_n = l$, where $l \neq 0$, and $\lim\limits_{n\to\infty} b_n$ does not exist then $\lim\limits_{n\to\infty} a_n b_n$ does not exist.

   (c)   Find two sequences $\{a_n\}$ and $\{b_n\}$ so that $\lim\limits_{n\to\infty} a_n = 0$, $\lim\limits_{n\to\infty} b_n$ does not exist but $\lim\limits_{n\to\infty} a_n b_n$ exists.

   (d)   Find two sequences $\{a_n\}$ and $\{b_n\}$ so that $\lim\limits_{n\to\infty} a_n = 0$, $\lim\limits_{n\to\infty} b_n$ does not exist but $\lim\limits_{n\to\infty} a_n b_n$ do not exist.

2. Complete the following table with $+\infty$, $-\infty$, 0 or ? (undetermined).

$\lim\limits_{n\to\infty} a_n =$	$\lim\limits_{n\to\infty} b_n =$	$c_n =$	$\lim\limits_{n\to\infty} c_n =$
$+\infty$	b	$a_n + b_n$	
$-\infty$	b	$a_n + b_n$	
$+\infty$	$+\infty$	$a_n + b_n$	
$-\infty$	$-\infty$	$a_n + b_n$	
$+\infty$	$+\infty$	$a_n - b_n$	
$-\infty$	$-\infty$	$a_n - b_n$	
$+\infty$	$b > 0$	$a_n b_n$	
$+\infty$	$b < 0$	$a_n b_n$	
$+\infty$	$+\infty$	$a_n b_n$	
$+\infty$	$-\infty$	$a_n b_n$	
$-\infty$	$b > 0$	$a_n b_n$	
$-\infty$	$b < 0$	$a_n b_n$	
$-\infty$	$-\infty$	$a_n b_n$	
$+\infty$	0	$a_n b_n$	
$-\infty$	0	$a_n b_n$	
a	$+\infty$	a_n / b_n	
$+\infty$	$+\infty$	a_n / b_n	
$+\infty$	0	a_n / b_n	
0	0	a_n / b_n	