(1) Determine whether the sequence \( \{ s_n \} \) is convergent or divergent. If convergent, find the limit. (You do not need to prove the limit.)

(a) \( s_n = \frac{2n^3 - 79n^2 + 42}{5n^{5/2} + 1} \)

(b) \( s_n = \frac{2n^3 - 79n^2 + 42}{5n^3 + 1} \)

(c) \( s_n = \frac{2n^3 - 79n^2 + 42}{5n^4 - 100n^3 + 1} \)

(2) For each sequence \( \{ s_n \} \), reason informally to determine whether or not it is convergent, and if convergent to find its limit \( L \). If your informal reasoning indicates that the limit should be \( L \), use the definition of limit of a sequence to show that in fact, \( \lim s_n = L \). If your informal reasoning suggests that the sequence is divergent, show this by using the definition of limit or a theorem (or the contrapositive of a theorem).

(a) \( s_n = \frac{10000n - 1}{n^2 + 500} \)
(b) \[ s_n = \frac{2n^3 - 5n + 7}{5n^4 + 4} \]

(3) Is the following statement true or false? If it is true, prove it. If it is false, provide a counterexample: If \(|s_n|\) is convergent, then \(s_n\) is convergent.

(4) Suppose \(\{a_n\}\) is divergent, and \(\{b_n\}\) is convergent. Is \(\left\{\frac{a_n}{b_n}\right\}\) convergent or divergent? If it is convergent, give a proof. If it is divergent, provide a counterexample.