Implicit in any homework problem is that you must explain why your answer is correct, even if the problem does not ask for a formal proof. Writing problems should have complete explanations of your work, written in complete sentences with correct grammar.

**Due: Thursday, 11/3**

## Homework Assignment

**Regular Problems**:

(1) Prove the following sequences diverge according to the definition in Section 16:
  (a) $a_n = n^2$
  (b) $b_n = \sin\left(\frac{\pi n}{2}\right)$

(2) For each of the following, prove or give a counterexample.
  (a) If $s_n \to s$, then $s$ is an accumulation point of the set of numbers $\{s_n \mid n \in \mathbb{N}\}$.
  (b) If $s$ is an accumulation point of the set of numbers $\{s_n \mid n \in \mathbb{N}\}$, then $s_n \to s$.

(3) For each of the following, prove or give a counterexample. You may use Theorem 17.1 in any proofs, but make sure it applies in the way you use it.
  (a) If $(s_n)$ converges and $(t_n)$ diverges, then $(s_n t_n)$ must be divergent.
  (b) If $(s_n)$ and $(s_n/t_n)$ are convergent sequences, then $(t_n)$ must converge.
  (c) If $(s_n/t_n)$ converges, then $t_n$ cannot converge to 0.

(4) Use Theorem 17.1 to find the following limits. Justify each step.
  (a) $\lim \frac{(n+1)^2}{n^3 - 5n^2 + 1}$
  (b) $\lim \frac{9n+1}{6-n}$

**Writing Problem 1**: Use Theorem 16.8 to prove that $s_n = \frac{3n^2 - 1}{2n^3 - 5n} \to 0$.

**Writing Problem 2**: Suppose $(s_n)$ converges to $s \neq 0$ and $(s_n t_n)$ converges to $L$. Prove that $(t_n)$ converges. (Hint/Warning: you cannot assume $s_n \neq 0$ for all $n$.)