Math 2510-410 **Homework #4** **Due: Fri., Mar. 6^{th}, 2015**

1. Prove that $\left\langle \dfrac{1}{n^3 + 12345} \right\rangle$ converges to 0.
2. Show that $\left\langle \dfrac{n^2 + 5}{4n^2} \right\rangle$ where $n > 0$ converges to $\dfrac{1}{4}$.
3. Consider the sequence $\left\langle (-1)^n n^2 \right\rangle$. This sequence obviously diverges.
   (a) Prove that this sequence diverges by showing it is unbounded.
   (b) Prove that this sequence diverges by showing it does not converge to any real number L.
4. Suppose that $\langle a_n \rangle$ converges to L. Show that $\langle |a_n| \rangle$ converges to $|L|$.
5. Suppose that $\langle a_n \rangle$ and $\langle b_n \rangle$ converge to 0. Show that $\langle a_n b_n \rangle$ converges to 0 as well.