Name: _____

Please show all work. If you use a theorem, name it or state it.

1. Suppose (x_n) is a bounded sequence and $\lim y_n = 0$. Use the definition of limit to prove $\lim x_n y_n = 0$.

2. Suppose (x_n) is sequence in $\mathbf{R}$ that is not bounded above. Prove that (x_n) has a subsequence convergent to $+\infty$.

3. Suppose (x_n) is a bounded sequence in $\mathbf{R}$ and $\limsup x_n = \liminf x_n$. What can you conclude? Prove your assertion.

4. Prove that every Cauchy sequence in $\mathbf{R}$ is bounded.

5. Suppose $\sum x_n$ is convergent and $\sum y_n$ is divergent. Prove $\sum (x_n + y_n)$ is divergent.

1	2	3	4	5	total (50)