Math 315-003 | Test | Name __________________
30–31 January 2004 | Show relevant work! |
D. Wright

1. Define what it means for a subset $A \subset \mathbf{R}$ to be bounded.

2. State the Completeness Axiom.

3. State the Archimedian Property.

4. Prove $\lim_{n\to\infty} \frac{1}{n} = 0$.

5. Show a convergent sequence is bounded.

6. Show a bounded increasing sequence converges to its supremum.

7. Give the sequence definition of what it means for a function $f : D \to \mathbf{R}$ to be continuous at a point $x_0$.

8. Give the epsilon-delta definition of what it means for a function $f : D \to \mathbf{R}$ to be continuous at a point $x_0$.

9. If $x_n \to A$ and $y_n \to B$ are convergent sequences, show $x_n y_n \to AB$.

10. Show a continuous function on a closed interval is bounded above.

11. If $0 < r < 1$, show that $\lim_{n\to\infty} r^n = 0$.

12. Prove the Special Case of the Intermediate Value Theorem. If $f : [a,b] \to \mathbf{R}$ is a continuous function with $f(a) < 0$ and $f(b) > 0$, show there is a point $x_0$ in the open interval $(a,b)$ at which $f(x_0) = 0$.