Math 315 Sections 1 and 2 Test 2 Name ________________
16–17 March 2007 Show relevant work!
D. Wright

1. Let $f : A \to R$ be a real-valued function. Give the sequence definition of continuity and the $\varepsilon - \delta$ definition of continuity.

2. Prove that a closed interval has the property that if it covered by a collection of open sets, then some finite sub-collection of the open sets covers.

3. Given f and g are differentiable functions with domain all real numbers. If $g(x) \neq 0$, prove that $F(x) = \dfrac{f(x)}{g(x)}$ is differentiable at c and find the derivative

4. State and prove the Mean Value Theorem.

5. Prove the uniform limit of continuous functions is continuous.

6. Show that if f is a differentiable, real-valued function defined for all real numbers with a bounded derivative, then f is uniformly continuous.

7. Show that $f(x) = \dfrac{1}{x^2}$ is not uniformly continuous on $(0,1]$.

8. Prove or give a counterexample. If $f_n \to f$ point-wise on an interval and each f_n is increasing, then f is also increasing.