MATH 2250, Fall 2010.
Homework assignment, Oct. 27, 2010

1. Complete the proof of the maximum principle for functions satisfying weak mean value property (wMVP$_2$). Be sure to write the continuous induction.

2. Show that a real-valued continuous function satisfying weak mean value property (say (wMVP$_2$)) has to be harmonic. **Hint:** Show first that if a function is continuous in a closed disc, zero on its boundary and satisfies the maximum and minimum property, then it is identically 0.

3. Construct a bounded harmonic function u in the strip $0 \leq \in z \leq 1$ such that

$$u(x) = 0, \qquad u(x+i) = 1 \qquad \forall x \in \mathbb{R}.$$

Show that such function is unique.

Is it unique if we do not require u to be bounded?