

## HW # 4

Clark Kent, errrr, Superman!

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*Hello, awesome people of Metropolis! Here is your next homework assignment on continuous functions. Even though the exam will cover continuous functions, this assignment on them will not be due until Tuesday November 4th. That should give you some good decompression time after the exam, and then carefully write up solutions. Have fun! ROCK ON!*

1. Do problems 2, 5, 6, and 13 on page 111 from Section 18.
2. Think seriously about doing the optional problem number 1 on page 111. Corey did it in class, but thinks that if you could close the book and describe the solution to someone else without any help, you must be on the right track.
3. Let  $f, g : \mathbb{R} \rightarrow \mathbb{R}$  be continuous functions. Show that the functions  $h_m(x) := \min\{f(x), g(x)\}$  and  $h_M(x) := \max\{f(x), g(x)\}$  are continuous functions.
4. Let  $X$  be a set and let  $\tau$  and  $\tau'$  be two topologies on  $X$ . Thus one may consider, as possibly different spaces, the topology  $(X, \tau)$  or  $(X, \tau')$ . Prove that  $(X, \tau)$  is homeomorphic to  $(X, \tau')$  if and only if  $\tau = \tau'$ . (This shows that the notion of a homeomorphism is exactly the notion which would *equate* topological spaces, by equating the sets and equating the sets considered open.)