

Please feel free to contact Prof. Mark Meckes with questions or to determine if you should take Math 305 or 307. Please bring a copy of the self test along with you.

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## Sample questions for MATH 305

Write out answers to the following questions.

1. Prove by induction that  $2^n > n$  for all natural numbers  $n$ .
2. What is “proof by contradiction”, and why does it work?
3. What is the negative of the following statement (that is, what would it mean to say the statement is false): For all  $\epsilon > 0$ , there is a  $\delta > 0$  such that if  $|x - y| < \delta$ , then  $|f(x) - f(y)| < \epsilon$ .
4. Is the following sentence true or false (explain): If  $x$  is a real number with  $|x| < 0$ , then  $2 < 1$ .
5. Give a precise definition of what it means for a function  $f$  on  $\mathbb{R}$  to be increasing. (Note: the point of this question isn't to find out if you know what “increasing” means, but if you can turn that knowledge into a precise mathematical definition.)