Hints for Assignment 2

November 1, 2006

1. Here is an approach to figuring out a value of L that works in case $a = 2$ and $n = 10$. We want to find a value of L such that $2^x > x^{10}$ for $x > L$. Start from the known fact that

$$2^{11} > 2^{10}.$$

This has the correct base on the left and the correct exponent on the right, but the x is different in each case. Start multiplying both sides by 2^{10} and use the exponent laws to simplify so that again you have an inequality with base 2 on the left and exponent 10 on the right. What do you notice about the xs as you keep doing this?

2. Another approach: You know that 2^x doubles every time you add 1 to x. What factor does x^{10} increase by every time you add 1 to x? [Hint: write down an algebraic expression for this factor and compare it to 2.] If you can ensure that x^{10} gets multiplied by a factor less than 2 every time x increases by 1, does that ensure that 2^x will eventually beat x^{10}? What about if it gets multiplied by a factor less than 1.5? [Hint: what factor does $2^x/x^{10}$ get multiplied by?