

Mathematics 216  
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Homework 3  
Due January 27, 2012

1. Find a value of  $N$  so that  $F_n > \left(\frac{3}{2}\right)^n$  if  $n > N$ , and then prove that the inequality is true by using induction.

2. Let  $n$  be a positive integer. Prove using induction (and l'Hôpital's rule) that

$$\lim_{x \rightarrow \infty} \frac{(\log x)^n}{x} = 0.$$

3. Let  $n$  be a positive integer. Prove using induction that  $n^3 + 2n$  is always a multiple of 3.