CS / MCS 401 Week #2 Exercises
(Spring, 2008)

Exercise 3.1–4 (*page 50*).

Exercise 3.2–6 (*page 57*).

Exercise 3–2 (*page 58*).   You make use of the facts proven in class about the relative rates of growth of logarithms, polynomials, and exponentials, i.e., Theorems 1, 2, and 3 on the *Rate of Growth: Exponentials, Polynomials, and Logarithms* handout.

Exercise 3–3, part (a) (*page 58*).   You may omit the functions involving lg*(n). Again, you make use of the facts proven in class about the relative rates of growth of logarithms, polynomials, and exponentials.

C1. Let $f(n)$ and $g(n)$ be functions such that $\lim_{n\to\infty} f(n) = \lim_{n\to\infty} g(n) = \infty$. If you wish, you may assume $\lim_{n\to\infty} f(n)/g(n)$ exists.

   a)   Prove that $f(n) = O(g(n))$ implies $\ln(f(n)) = O(\ln(g(n)))$.

   b)   Show by example that $\ln(f(n)) = O(\ln(g(n)))$ does **not** imply $f(n) = O(g(n))$.

C2. Use Stirling's Formula to obtain a good estimate of the value of 51! (51 factorial). Then include the $1 + 1/(12n)$ term to obtain an even better estimate. Write your answers in scientific notation, with enough decimal places shown to distinguish the two estimates.