

Math 128a, Chorin, Spring 2013, homework 6, due the week of March 18.

(The homework from last week is also due the same week because of the delay caused by the midterm. This new homework is therefore quite short).

1. For each of the following functions, determine whether it is Lipschitz continuous on $[0, 1]$, and if yes, find a Lipschitz constant: (i) $f(x) = x^2$; (ii) $f(x) = \sqrt{x}$; (iii) $f(x) = e^x$.
2. Find the general solution of the finite difference equations: (i) $u_{i+1} = 2u_i - u_{i-1}$; (ii) $u_{i+1} = 3u_i - 2u_{i-1}$.
3. Find the solution of the difference equation $u_{i+1} = 2u_i - u_{i-1}$ subject to the conditions $u_0 = 1, u_1 = 2$.
4. Assume that the variables $h \rightarrow 0, i \rightarrow \infty$ subject to the constraint $ih = x$, where x is fixed and i is an integer. Decide which of the following limits is finite: (i) $\lim(1+h)^i$; (ii) $\lim(1+\sqrt{h})^i$, (iii) $\lim(1+h^2)^i$.