Homework - MTH 357

Instructions: Homework is to be neat and organized. **If it's messy it's wrong.** Answers without the necessary supporting work are worth 0. You may discuss problems with others but must always produce your own work and write your own solutions. Copying someone else's homework is considered cheating.

HW7, due 11/16

1. Find the Fourier series representation of $u(x,t)$, the solution to the wave equation with $c = 1$, $L = 1$, $g(x) = 0$, and $f(x) = 0.01x(1-x)$ on $0 \leq x < 1$, extended as an odd function. List the first 4 non-zero terms. You may use Mathematica to find B_n but only if you submit the notebook file showing your work.

2. Using your solution to #1, plot $f(x)$, $u(x,0)$, and $u(x,0.5)$ on the same graph.

3. Using D'Alembert's solution to #1 (i.e. $u(x,t) = \frac{1}{2}(f(x+t)+f(x-t))$), plot $u(x,t)$, $\frac{1}{2}f(x+t)$, and $\frac{1}{2}f(x-t)$ on the same graph, creating one graph for each of $t = 0, 0.2., 0.4, 0.6, 0.8$, and 1. You probably want to use Mathematica for this. Note, you MUST extend $f(x)$ to be odd with period 2.