Ay190 – Worksheet 11

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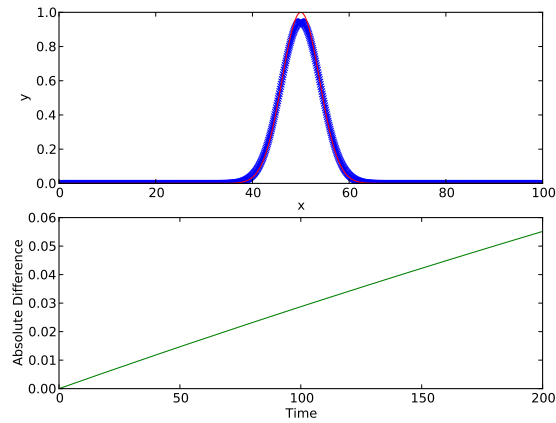Lords of Waterdeep: Mee Chatarin Wongurailertkun, David Vartanyan

Problem 2

Figure 1: This is the plot of the upwind model using $\sigma = \sqrt{15}$.
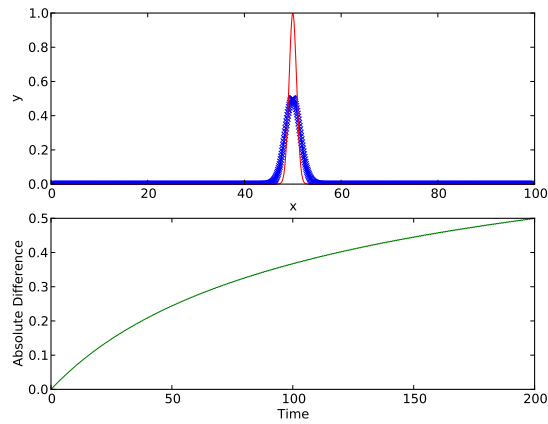

Figure 2: This is the plot of the upwind model where $\sigma = \sqrt{15}/5$. Notice that, after 2000 iterations, the numerical solution diverges pretty strongly, especially about the center.
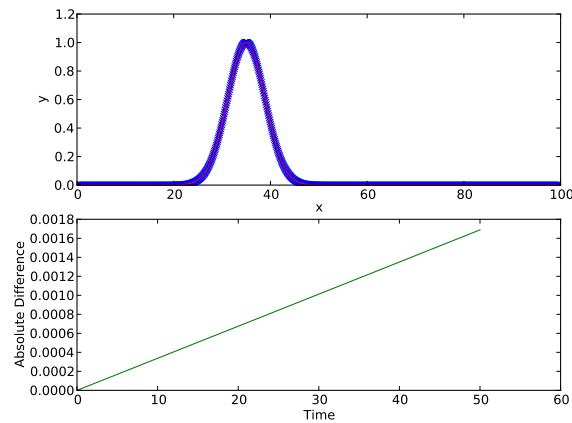
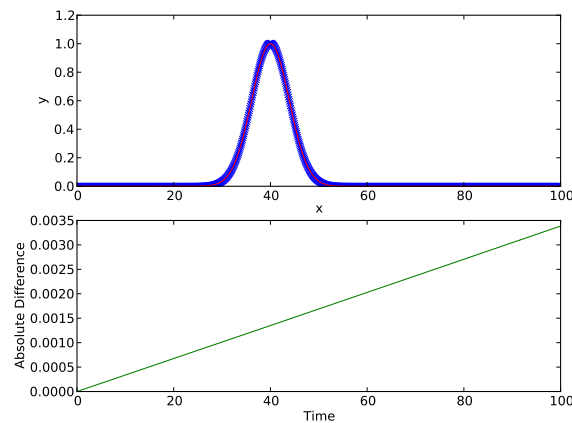Figure 3: This is the plot of the FTCS model for $n = 500$.

Figure 4: This is the plot of the FTCS model for $n = 1000$.

Problem 3

At first, the numerical solution stays relatively close to the analytical result, but at large numbers of iterations, the two diverge significantly, and the numerical solution becomes pretty unstable.

Problem 4

The Lax-Friedrich model begins to diverge from the analytical result at about $n = 500$, producing a shorter and wider Gaussian profile.
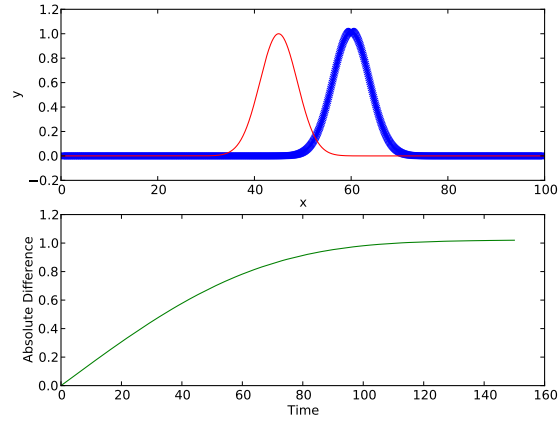
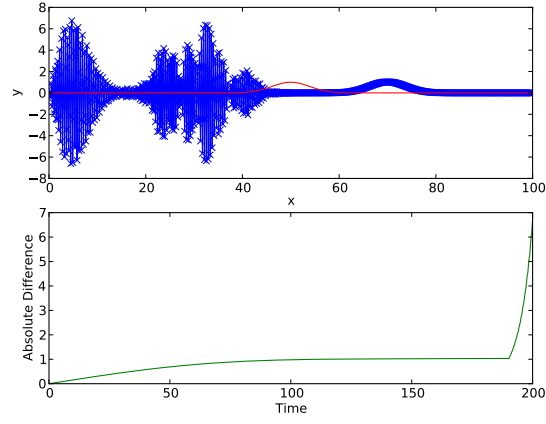Figure 5: This is the plot of the FTCS model for $n = 1500$.

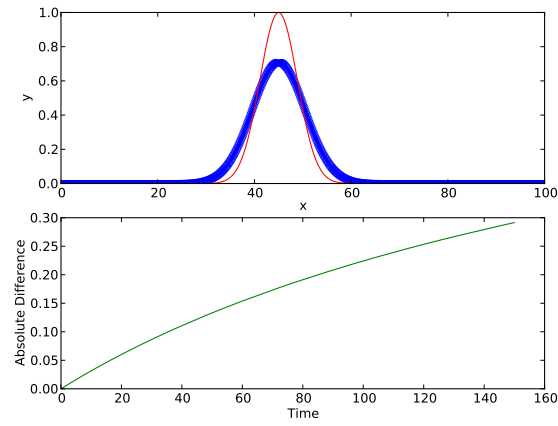Figure 6: This is the plot of the FTCS model for $n = 2000$.

Figure 7: This is the plot of the Lax-Friedrich model for $n = 1500$.
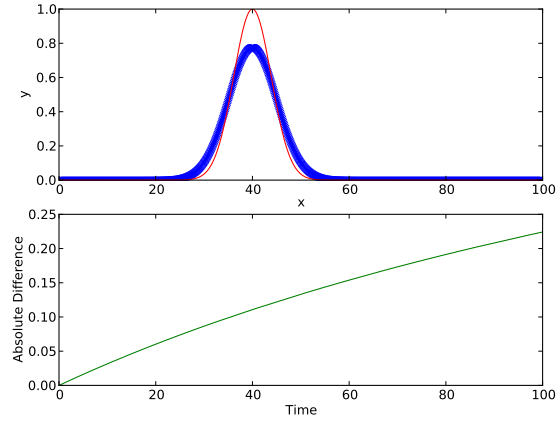
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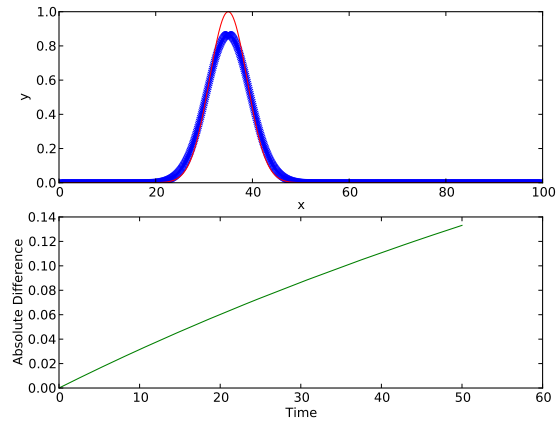Figure 8: This is the plot of the Lax-Friedrich model for $n = 1000$.

Figure 9: This is the plot of the Lax-Friedrich model for $n = 500$.

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