AMath 574
Homework 3
Due by 11:00pm on February 12, 2015

For submission instructions, see:

`http://faculty.washington.edu/rjl/classes/am574w2015/homework3.html`

---

**Problem #11.2 in the book**

---

**Problem #11.3 in the book**

---

**Problem #11.8 in the book**

---

**Problem #13.1 in the book**

---

**Problem #13.7 in the book, only parts (a)–(c) and case (i) from (d)**

---

**Programming problem**

(This Clawpack code will be discussed in more detail in lab on Feb. 6.)

Copy the the Clawpack code `$AM574/labs/lab5/burgers` to your repository as a directory `am574-studentN/hw3/expflux` and modify the code so that it solves the problem from #11.8(c) with the exponential flux function $f(q) = \exp(q)$.

Make the following changes:

- Rename the Riemann solver `rp1_expflux.f90` and modify it appropriately. Note:
  - You do not need an "entropy fix" for this problem since $f'(q) > 0$ for all $q$.
  - When computing the speed $s$, make sure you don't divide by 0. When $q_\ell \approx q_r$, use $f'(q_\ell)$ in place of the Rankine-Hugoniot wave speed.
- Modify the `Makefile` so that it uses the new Riemann solver.
- Modify the initial conditions in `qinit.f` appropriately.
- Adjust `setrun.py` so that:
  - 100 grid cells are used on the interval $-1 \leq x \leq 4$.
  - The MC limiter is used with the high-resolution method.
  - 20 output frames are produced, equally spaced up to time $t = 1$.

The plots produced by running this code should be similar to what's seen at
`http://faculty.washington.edu/rjl/misc/expflux/_PlotIndex.html`.

**Optional:** Add code to `setplot.py` to also plot the true solution at each time.

Make sure you have committed any files to your repository that are needed to run your code and produce the plots.