

# HW 4: Answering the Midterm Exit Questions

## EPSS 171 Winter 2019

### Advanced Computing for Geoscience Types

### 6 Total Course Points

**DUE: Tuesday, February 12th, 11:00 am**  
**(with 10% off the final score for every hour it is turned in late)**

- **MIDTERM OPEN QUESTIONS:**
  - Why is there a systematic trend in the  $q(z)$  values? What controls this trend?
  - And what would happen to  $q$  if random noise was (realistically) included in this synthetic data set?

Use the Data Generation portion of the Midterm Key (or do this by modifying your midterm script) to address the Open Questions via the following exercises.

1) (+3 Points.) Make plots (or a subplot) to determine how the systematic trend in  $q(z)$  is affected by

- Changing the amplitude of the daily thermal wave;
- Changing the amplitude of the seasonal thermal wave.
- Increasing the number of temperature measurements made per day.
- **And answer me this:** At 24 samples/day, to what degree will such trends affect the inSight mission  $q$  measurements?

2) (+3 Points.) For our estimates of Martian conditions, make a plot showing how much random noise (as formulated in the Midterm Key) can be added to the system without compromising the  $q$  measurements.

- aka, Determine for what noise amplitude (if any) the measured heat flux departs from the known value by  $> 20\%$ .
- **And answer me this:** With estimates of 6.5 milliKelvin variations on their thermistors, is noise likely to be an issue for the inSight mission?