COMPUTATIONAL ASTRONOMY '17 SPRING
MAR. 15 DUE: 10:30AM MAR. 22 (WED)

PROBLEM SET #1

For the problems below, you need to write programs using Python. Turn in your own source programs written independently together with reports in pdf format by email (both to `wkim@astro.snu.ac.kr` and `moon@astro.snu.ac.kr`.)

1. Write a Python script that takes two integers as keyboard inputs, and outputs the quotient and remainder when the larger is divided by the smaller. It is convenient to use the function `input()` to read the keyboard input. Your outputs should look something like

```
two integers: 78   and 1023
quotient    : 13
remainder   : 9
```

2. Write a Python script that reads a number from the keyboard, say `n`, and prints out a block letter **H** on the screen with sides of size `n`, like the ones shown below for `n = 3`, `2`, and `1`, respectively.

```
***   ***
***   ***
***   ***
*********
*********
*******|**
***   ***
***   ***
***   ***
```

```
**  **
**  **
******
******
**  **
**  **
```

```
* *
***
* *
```

3. A prime number is a positive integer (greater than 1) that has no positive integer divisors other than 1 and itself. Write a Python function using the keyword `def` that checks whether an integer `n` is prime or not, and call it to calculate the total number of prime numbers between `2` and a given number `nmax`. How many prime numbers when `namx=100`, `1000`, `10000` and `100000`?

4. Download the data file called `hw1_p4.dat` from the class webpage. It contains 3-column, 10000-row data. Write a Python script to read it, and outputs every fourth row starting from the first row into another file named `hw1_p4_fourth.dat`. Assign the first to third columns to the variables `x`, `a`, and `b`, respectively, and make a plot that shows `a*x`, `b*x`, and `a*b*x` as functions of `x` using solid, dotted, and dashed lines, respectively. Do not forget to place a legend at the appropriate place and name the abscissa and ordinate to `time` and `value`, respectively.