Hands-On Session

Review:
1) How can you input a value into a program that is a float? Do this in one line
2) How can you input a value into a program that is an integer? Ibid
3) What would happen if you give the wrong input value?

Mathematical Functions:
1) Addition, subtraction, multiplication, division
2) x//y is the integer part of (x divided by y) rounded down:
    a. 14//3 = integer(4.666….) = 4
    b. -14//3 = integer(-4.6666…) = -5
3) x%y is the modulo, i.e. the remainder of x divided by y.
    a. 14%3 ➔ 14/3 = 4R2 (3*4 = 12, 14-12 = 2)
    b. 1.5%0.4 ➔ 1.5/0.4 = 3R0.3 (3*0.4 = 1.2, 1.5-1.2 = 0.3)
    c. If the modulo is zero for x%y, one can tell that the x is divisible by y (good for checking if number is even/odd)
4) Expressions:
    a. x + 2*y
    b. 3*x**3
    c. x/2*y
    d. 2*x=y (this is NOT something the program can interpret)
5) ERRORS:
    a. ValueErro: invalid literal for float(): <variable name>
    b. SyntaxError: can't assign to operator
    c. No error message but your code is doing sth wrong. These are the hardest errors to find!
6) Packages
    a. math contains:
        i. log, log10, exp, sin, cos, tan, asin, acos, atan, sinh, cosh, tanh, sqrt
        ii. pi (3.14159265359…) , e (2.71828182846…)
        iii. Special functions (error function erf, erfc, gamma, lgamma)
    b. How to use them – first you need to load them:
        i. from math import log
        ii. from math import sqrt
        iii. OR: from math import log,sqrt
        iv. from math import *
        v. import math
    c. How to use them – then you can implement them:
        i. x=log(10)
        ii. x=sqrt(10)
        iii. x=log(sqrt(10))
        iv. x=exp(7)
        v. x=math.tan(9)

7) Modules: some large packages contain so many utilities that they are divided into subpackages or modules. E.g. there is a large package called numpy (Numerical Python) that contains several modules. If you wanted to use a utility to invert matrices (**inv**) contained within the linear algebra module (**linalg**) contained in the **numpy** package, you can load it as:
   a. from numpy.linalg import inv
8) Write a program to solve the following problem: A ball is dropped initially at rest from different stories in STB. It accelerates downward under gravity (9.81m/s2). Write a program that asks the user to enter a height and a time interval after it is dropped and then reports back the height above the ground (ignore air resistance and the effect of Jupiter).