COEN 45
Spring Quarter, 2010
Homework #6
Due Tues May 11

1. Write a function that computes three kinds of "mean" values of a list of numbers:

   - Ordinary mean or average:

   $$M = \frac{\sum_{i=1}^{n} x_i}{n}$$

   - Geometric mean

   $$M = \left(\prod_{i=1}^{n} x_i \right)^{1/n}$$

   (Π means "product")

   - Harmonic mean

   $$M = \frac{n}{\sum_{i=1}^{n} \frac{1}{x_i}}$$

   Rules:

   - Issue an error message if not all `x` values are positive.
   - Do not use MATLAB's built-in `mean` function
   - You may use `sum` and `prod`.
   - Use a `switch` construction

   Your function should start like this:

```
function mean = mymean(x,type);
%
%  Find the mean of a list of positive numbers
%  Input
%       x -- vector of numbers
%       type -- a letter, either 'M', 'G', 'H'
%           M -- ordinary mean (average)
%           G -- geometric mean
%           H -- harmonic mean
%
error(nargchk(2,2,nargin));
```

   Write a script that exercises this function by showing each type of mean for `x = [7 3 8 2 1 7 6 5 1 2];`

   Also show that the three kinds of mean are the same when all the `x` values are the same.

2. The concentration of a drug in the body, C_p, can be modeled by

$$C_P = \frac{D_G}{V_d}\frac{k_a}{(k_a - k_e)}(e^{-k_e t} - e^{-k_a t})$$

where

- C_P is the concentration in mg per liter of body tissue
- D_G is the dosage administered (150 mg),
- V_d is the volume administered (50 liters)
- k_a is the absorbtion rate constant (1.6/hour)
- k_e is the elimination rate constant (0.4/hour)

(a) Calculate and plot C_p versus t for 10 hours when a single dose is administered at $t = 0$.

(b) Calculate and plot C_p versus t for 10 hours when doses are administered every four hours ($t = 0, 4, 8, 12, 16$).

You should get a plot like this: