Statistics 6620/4960

Preliminary programming exercises

Write code using conditional and looping statements to solve the problem.

Then solve the problem using R "vectorized" code if possible.

Assume you have numeric vectors of positive length for the following problems. That is, you do not have to perform any error checking for these problems.

1. Find the indices of a vector x for which x > 10. If x = c(3,12,4,17) you should report the vector (2,4) as your answer.
2. Find if the vector x is symmetric. The example x vector in the previous problem is not symmetric, but x = c(5,7,2,7,5) is symmetric.
3. Given a scalar number (which is a vector of length 1 in R terminology), determine if the number has an integer value.
4. Given a scalar number, determine the fractional part of the number.
5. Given a vector named x, compute a vector that has the fractional part of each x element. If x = c(2.3,7.8,2.13) your computed vector should be (0.3,0.8,0.13). First see if your solution to the previous problem will work for a vector as well as a scalar. Many times it will in R.
6. Find the location of the maximum element in a vector x.
7. Given a vector x determine if x is sorted in ascending order.
8. Given an integer n, compute the value of n!
9. Compute the cumulative sum of a vector x.
10. Compute the value of a finite geometric series. You are given a (the starting value), r (the ratio), and n, the number of terms in the finite series. Compute a + a*r + a*r^2 + … + a*r^(n-1).
11. Given two vectors x and y of identical length compute a vector z, where z[i] = max(x[i],y[i])
12. You are given three points in 2-dimensional points. Call the points p, q, r. The points are represented as a vector of length 2. Determine which of the other points is closest to p.
13. The situation is the same as the previous problem. Calculate the area of the triangle formed by p, q, and r.