Conversion of Positive Decimal Fractions to Binary Forms
(Due on Tuesday, 9/16/14)

The following algorithm can be used to convert a positive decimal fraction \( x < 1 \) to its binary equivalent.

\[
x = (a_1a_2a_3...)_2 = a_1 \cdot 2^{-1} + a_2 \cdot 2^{-2} + a_3 \cdot 2^{-3} + \cdots
\]

1. input \( x \).

2. For \( n=1:N \)
   
   (a) \( a := \) Integer part of \( 2 \cdot x \);
   
   (b) OUTPUT \( a \);
   
   (c) \( x := \) Fractional part of \( 2 \cdot x \);
   
   (d) if \( x = 0 \), stop the computation

END For

An example is

\[
0.3 = (.010011001100110011001100110011001100110011001100110011)
\]

Implement the above algorithm in Matlab and apply it to the numbers (a) 0.8125, (b) 0.1, (c) 0.4, and (d) 0.31415926.

Turn in your report. The report should be in reasonable length, say a page or two, but it should contain the following contents:

1. Introduction – Problem description

2. Mathematical Formulation – Numerical method and definitions of parameters

3. Numerical Experiments – Discussion and analysis of your numerical results (Use tables and/or figures when necessary)

4. Conclusions

Attach a copy of your program to the report.