Math 253N Assignment 1, Spring 2017 **Due at the start of class on April 4th**

1. Consider the sequence $2, 5, 8, 11, 14, \ldots$ and assume that the pattern established continues.

   (a) Give a recurrence relation for the sequence.

   (b) Give an explicit formula for the sequence. *Include the domain that you choose.*

2. For each sequence $\{a_n\}_{n=0}^{\infty}$ (defined either explicitly or recursively),

   - Give the first five terms of the sequence followed by ... **Give in fraction form.**
   - Tell whether the series diverges (by writing the word *diverges*) or, if it converges, tell what it converges to (by writing *converges to #*).

   (a) $a_n = 1 + \left(-\frac{1}{2}\right)^n \ ; \ \ n = 1, 2, 3, 4, \ldots$

   (b) $a_{n+1} = 1 + \frac{a_n}{2} \ ; \ \ a_0 = 2$

   (c) $a_n = (-1)^n \left(1 - \frac{1}{2^n}\right) \ ; \ \ n = 1, 2, 3, 4, \ldots$

   (d) $a_{n+1} = 1 + 2a_n \ ; \ \ a_0 = 2$

3. Consider the sequence $\{a_n\}_{n=0}^{\infty}$ defined recursively by $a_{n+1} = \frac{2}{3}a_n; \quad a_0 = 5$

(a) Give the first five terms of the sequence (including the zeroth term), followed by ...

(b) Give what you believe the limit of the sequence to be, **using correct notation**.

(c) Give the explicit formula for the sequence with domain $n = 0, 1, 2, 3, ...$

(d) Give the explicit formula for the sequence with domain $n = 1, 2, 3, 4, ...$

(e) Give the first five partial sums of the series $a_0 + a_1 + a_2 + a_3 + \cdots,$ each labeled as S_n for the appropriate value of n. **Give each in exact form (no decimals).**