**Assignment#2; Due January 28 at start of class**

Let set **A** be non-empty recursive, **B** be re non-recursive and **C** be non-re. Using the terminology **(REC)** **recursive**, **(RE) non-recursive recursively enumerable**, **(NR)** **non-re**, categorize each set below, saying whether or not the set can be of the given category and justifying each answer. You may assume, for any set **S**, the existence of comparably hard sets   
**SE = {2x|x∈S}** and **SD = {2x+1|x∈S}**. The following is a sample of the kind of answer I require:

**Sample.) A ∩ C = { x | x ∈ A and x ∈ C }**

**REC: Yes. If A = {0} then A ∩ C = ∅ ot {0}, each of which is in REC.**

**RE: Yes. Let A = ℵE = { 2x | x ∈ ℵ }; let C = TOTD ∪ HALTE then A ∩ C = HALTE which is in RE**

**NR: Yes. If A = ℵ then A ∩ C = C, which is in NR.**

**a.) B – A = { x | x ∈ B and x ∉ A } // Set difference**

**b.) A \* B = { x \* y | x ∈ A and y ∈ B } // Multiplication**

**c.) A ∪ C = { x | x ∈ A or x ∈ C } // Set union**

Be careful: Some may not be possible. If so, you must justify why this is so.

Note:

TOT = { x | ∀ ϕx (y) ↓ }. These are the indices of the set of algorithms.

HALT = { <x,y> | ϕx (y) ↓ }. This is the set of pairs of procedures and input for which the given procedure halts.

The set SE for any set S is defined as {2x | x ∈ S }

SD = { 2x+1 | x ∈ S }.