Assignment #4 Key; Due February 13 at start of class

Choosing from among **(REC) recursive**, **(RE) re non-recursive, (coRE) co-re non-recursive**, **(NRNC) non-re/non-co-re**, categorize each of the sets in a) through d). Justify your answer by showing some minimal quantification of some known recursive predicate.

a.) **{ f | domain(f) is infinite }**

NRNC

Justification: $\forall x \exists \langle y,t \rangle [y \geq x \ \& \ STP(f,y,t)]$

b.) **{ f | |range(f)| = 1 }**

NRNC

Justification: $\exists \langle x,t \rangle \forall \langle y,t' \rangle [STP(f,x,t) \ \&\& \ (STP(f,y,t') \Rightarrow (VALUE(f,y,t') = VALUE(f,x,t)))]$

c.) **{ <f,x> | f(x) converges in at most 2*x+1 steps }**

REC

Justification: **STP(f, x, 2*x+1)**

d.) **{ f | domain(f) converges in at most 2*x+1 steps for all input x }**

coRE

Justification: $\forall x$ **STP(f, x, 2*x+1)**