Assignment #4; Due February 24 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.) **$\{ < f, g > \mid \text{ domain}(\varphi_f) \subseteq \text{domain}(\varphi_g) \}$**

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Justification:

Note: This allows equal domains, but even works if domain(φ_f) is Ø and domain(φ_g) is $\aleph$.

b.) **$\{ f \mid$ no number appears more than once in range(φ_f) $\}$**

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Justification:

Note: This can include functions whose ranges are empty and even those whose ranges do include all natural numbers.

c.) **$\{ f \mid \varphi_f(f)\downarrow$ in at most f+1 steps $\}$**

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Justification:

Note: This is similar to the set **K** but involves an added twist.

d.) **$\{ f \mid \varphi_f(f)\downarrow$ but takes at least f+1 steps to do so $\}$**

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Justification:

Note: This is also similar to **K** but has a twist that differs from that in part (c).

e.) **$\{ < f, x, y > \mid \varphi_f(x)\downarrow$ and $\varphi_f(y)\downarrow$ but $\varphi_f(x)$ takes longer to converge than does $\varphi_f(y)$ $\}$**

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Justification:

Note: Be careful to address the fact that φ_f converges on both **x** and **y**.