Assignment # 9.1 Sample

1. Use quantification of an algorithmic predicate to estimate the complexity (decidable, re, co-re, non-re) of each of the following, (a)-(d):

a) REPEATS = { f | for some x and y, x ≠ y, f(x)↓, f(y)↓ and f(x) == f(y) }

b) DOUBLES = { f | for all x, f(x)↓, f(x+1)↓ and f(x+1)=2*f(x) }

c) DIVEVEN = { f | for all x, f(2*x)↑ }

d) QUICK10={ f | f(x), for all 0≤x≤9, converges in at most x+10 steps }

Assignment # 9.2 Sample

2. Let sets A be recursive (decidable) and B be re non-recursive (undecidable).
   Consider $C = \{\, z \mid min(x,y), \text{ where } x \in A \text{ and } y \in B \,\}$. For (a)-(c), either show sets A and B with the specified property or demonstrate that this property cannot hold.

a) Can C be recursive?

b) Can C be non-recursive?

c) Can C be non-re?