5. The language L cat enabler^n fancier^m o cat enable^{p}fancier^q | n,m,p,q $\geq$ 1 and n = p and m = q

   Proof by contradiction: Assume that L is a CFL we will use cat enabler^p fancier^p o cat enable^{p}fancier^p Since this is greater than p and string S $\in$ L we know we can pump and follow these conditions: i. for each i $\geq$ 0, uv^{i}xy^{i}z $\in$ L,
   ii. |vy| > 0, and
   iii. |vxy| $\leq$ p

   There are a few conditions for the layout of s = uv^{i}xy^{i}z

   Case one: u = ϵ vxy = cat enabler^p z = 0 cat enabler^p fancier^p. if we pump S where i = 2 we will end up with more enablers than fanciers which breaks the condition that n = p and is not in L which means we break the first case of the pumping lemma.

   Case two: u = cat enabler, vxy = fancier^p, z = o cat enabler^p fancier^p. Again if we pump S where i = 2 we will end up with more fanciers than enablers and given the condition that m = n we know this is not in L and therefore breaks condition 1 of the pumping lemma.

   Case three: u = cat enabler$^{p/2}$, v = enabler$^{p/2}$ xy = fancier$^{p/2}$, z = o cat enabler^p fancier ^{p} If we pump S where i = 2 we will end up with n $\neq$ p and m $\neq$ q therefore it is not in L for any i and we have broken the first condition of the pumping lemma

   Through all of these cases we have shown any layout for uvxyz will break a condition for the pumping lemma therefore L is not a CFL by our proof by contradiction