5. Want to show that $\sum$ = a, b, c where L has a length of w that is 3 times the number of a's in w.

   Proof: by contradiction

   Assume L is a regular language with a pumping length p. Our string s = $a^p b^p c^p$. Because |s| $\geq$ p we know s can be pumped. To prove that s is regular there exists a way to write s = xy^iz s.t. it follows the 3 conditions of pumping lemma:

   i. xy^iz *in* L for every $i \geq 0$

   ii.|y| > 0

   iii. |xy| $\leq$ p

   Let p=2, x = a, y = a, z = bbcc

   s = aabbcc and since 1/3 of the letters are a this $\in$ L

   However, if we let i = 0 meaning y becomes ϵ the string becomes xy^0z = abbcc. Therefore the ratio of a's is only $1/5 \neq 1/3$.

   This is a contradiction as it does not follow case i that state $xy^iz \in$ L for every $i \geq 0$.