1.46

Prove the following languages are ^{not} regular

a. $\{0^n 1^m 0^n \mid m, n \geq 0\} = L$

Assume L is regular

Pumping Lemma, $\exists$ a pumping length, p for L s.t.
any string in language L where $|s| \geq p$, $s = xyz$ with
the conditions

(a) $|y| > 0$ (b) $|xy| \leq p$ (c) $\forall i > 0$, $xy^iz \in L$

Let $s = 0^p 1 0^p$, $|s| \geq p$ using condition $|xy| \leq p$ $n = p$, $m = 1$
x and y can only be 0's

using (a) $y = 0^k$ for some $K > 0$.

In (c) if $i = 0$, the result is within L. Therefore xy^0z should

$$xy^0z = xz = 0^{(p-k)} 1 0^p$$

But this does not reside in L, therefore contradicts
and is not a regular language