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Homework 5

Problem 1:

Prove by Counter Example
Let L1 = { ω : ω is odd} and L2 = {ω : ω is odd and contains 0^n: n is prime}
$L2 \subset L1$, but L2 is not regular by the pumping lemma
Suppose L2 is regular and contains string S = 0^n, y = 0^k
S = $0^{(n-k)}0^k$
Let i = n+1, then S = $xy^{(n+1)}z$ = $0^{(n-k)}0^{((n+1)k)}$
So, n-k + (n+1)k = n-k + nk + k = n +nk = n(k+1), which is divisible by n and k+1
meaning n is not prime and $S' \notin L2$
Therefore L2 is not regular.

Problem 2:

Proof by Counter Example
If L1 ={ $0^n 1^m$: $n \geq m$ } and L2 = { $0^{+1\},}$
then $L2 \subset L1$ and L2 is regular.

Problem 3:

For the string $0^p 1^0 0^p$ the values for x = 0^p, y = 1^0 and z = 0^p.
With y = 1^0, k = 0, we are not doing any pumping to the string. Because of this, we get p + 0 = p. Because the number of x's 0s and y's 1s are equal to the number of z's 0's (p), we cannot show that the language is not regular.