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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: