1. for each $i \geq 0$, xy^iz is in L
2. $|y| > 0$
3. $|xy| \leq p$

assume for contradiction 'L' is regular & let 'p' be the pumping length. Given by the Pumping Lemma. Consider the string '$s = a^p b^p c^p d^p$' in L where

$u = a^p b^p$, $v = c^p d^p$ & ~~$n_a(u) = n_b(v)$~~

$n_a(u) + n_c(u) = n_b(v) + n_d(v) = p$. 2p

According to pumping lemma 's' can be written as xyz where $|xy| \leq p$ $|y| > 0$ & xy^iz in L for all $i \geq 0$

Since $|xy| < p$ y consists only of 'a's

let's say $y = a^k$ for some $k > 0$

Now if we pump y for i=0 in the string

$s = xy^0z = xz = a^{p-k} b^p c^p d^p$ in

S., $n_a(u) + n_c(u) = (p-k) + p = 2p-k$

but $n_b(v) + n_d(v) = 2p$

$\because$ $k > 0$, $2p - k < 2p$

So $n_a(u) + n_c(u) \neq n_b(v) + n_d(v)$

which means S is not in L.

This contradicts the Pumping Lemma.

$\therefore$ Our assumption was wrong.

So L is not regular

Pretty well written.