Tutorial 3

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Question 3a

L = { (ab)$^n a^k | n > k, k \geq 0$}
Let $n = p + 1$ $k = p$.
$S = (ab)^{p+1}a^p$
Case 1

$S = \underbrace{(ab)^p}_{x}\underbrace{(ab)}_{y}\underbrace{(a)^p}_{z}$
$S = xy^iz, i \geq 0$.
Let $i = 0, S = xz = (ab)^p a^p$.
Contradiction

Case 2

$S = \underbrace{(ab)^p a}_{x}\underbrace{ba}_{y}\underbrace{(a)^{p-1}}_{z}$
$S = xy^iz, i \geq 0$.
Let $i = 0, S = xz = (ab)^p aa^{p-1} = (ab)^p a^p$.
Contradiction

Case 3

$S = \underbrace{(ab)^{p-1}}_{x}\underbrace{bab}_{y}\underbrace{a(a)^{p-1}}_{z}$
$S = xy^iz, i \geq 0$.
Let $i = 2, S = xyyz = (ab)^{p-1}babbab(a)^p$
Contradiction

Case 4

Let y only consist of a's
$S = \underbrace{(ab)^{p+1}}_{x}\underbrace{(a)^{p}}_{y}$
$S = xy^i, i \geq 0.$
$S = xyy$
Contradiction

Question 3b