

Math 3342

Homework #6

2, 3, 6, 7b

$$\underline{\#2} \quad \frac{d}{d1} \{1^n 0^m\} = \{1^{n-1} 0^m\} = \{1^n 0^m\}$$

$$\underline{\#3} \quad \frac{d}{db^2} \{xx^R \mid x \in \{a,b\}^*\}$$

write $x = b^2 y$, so $xx^R = b^2 y y^R b^2$

$$\hookrightarrow = \{yy^R b^2 \mid y \in \{a,b\}^*\}$$

$$\underline{\#6} \quad L = \{(bab)^n b^n\} \text{ is nonregular}$$

$$\underline{\text{pf}} \quad \text{let } D_i = \frac{d}{d(bab)^i} L = \{(bab)^{n-i} b^n\}$$

so D_i has i fewer (bab) 's than b 's,
so the D_i are all different, so L is nonregular.

7b $L = \{xax^R\}$, Σ has more than 1 element.

L is nonregular

PF Say Σ has another letter b .

$$x = b^i y$$

$$xax^R = b^i y a y^R b^i$$

$$\text{let } D_i = \frac{d}{db^i} L = \{y a y^R b^i\}$$

Strings in D_i always end in b^i , so these are all different, so L is nonregular.