

# Notes on Midterm

# Midterm scores

40s	1
50s	6
60s	17
70s	19
80s	8
90s	3

mean/median/mode 71/72/73

$$L \subseteq \{a, b\}^*$$

## Problem 5

$$L_1 = \{x \mid \exists c \in \Sigma \text{ s.t. } cx \in L\}$$

$$L_2 = \{x \mid \exists c \in \Sigma, y \in \Sigma^* \text{ s.t. } x = cy, y \in L\}$$

$$L = \{\epsilon, a, ab, aba\}$$

$$L_1 = \{\epsilon, b, ba\}$$

$$L_2 = \{a, b, aa, ba, aab, bab, aaba, baba\}$$

$$L_2 = (a \cup b)^* \text{ (regexp for } L)$$

$$= \Sigma^*$$

# Fallacious “proof” #1

$$L = \Sigma \cdot L_1 \quad \text{so by closure under } \cdot \quad L_1 \text{ is regular}$$

$$\emptyset = \emptyset \cdot X$$

$$L = R \cup L_1$$

$$\Sigma^* = \Sigma^* \cup X$$

## Fallacious "proof" #2

"ALL Languages are regular"

$$L = \{ \overset{a^i}{x_1}, \overset{aba}{x_2}, \overset{abba}{x_3}, \dots \}$$

$x_1$  is a regular expr

$\therefore L_1 = \{x_1\}$  is regular

$L_k = \{x_1, x_2, \dots, x_k\}$  is reg.

$\forall k$

$$(L_k \cup L_{k+1}) = \{x_1, \dots, x_{k+1}\}$$

$$\rightarrow 0 \xrightarrow{a} 0 \xrightarrow{b} 0 \xrightarrow{a} 0 \xrightarrow{b} 0 \xrightarrow{a} 0$$

(0) (0) (0) (0)

This correctly shows that each  $L_k$  is regular for each finite  $k$ , no matter how large. It does not show that  $L$  is regular; induction never "jumps" to the infinite "limit" case.

## Fallacious "proof" #3



## Correct Construction

