

# Activity 3.2

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## INSTRUCTIONS

### Objective:

Upon completion this activity you will be able to: differentiate the concepts of work and unit work, understanding the fact that he being true and that he being false to using traditional procedures.

### Students Instructions:

1. Read each argument carefully.
2. Understands all the arguments and compares them with the knowledge acquired in the module.
3. Solve the sentences proposal.
4. For this activity you will only get 1 attempt for a total of 20 points.
5. The term of the activity is indicated in Tools-Calendar on the blackboard platform.

### Problem:

Let  $x$  be a string and let  $x^{\text{rev}}$  be "the same" string but backwards.

Prove that  $(xy)^{\text{rev}} = y^{\text{rev}}x^{\text{rev}}$  for arbitrary strings  $x, y$  over an alphabet  $\Sigma$ .

(Hint: try to define  $x^{\text{rev}}$  inductively)

Defining  $x^{\text{rev}}$  inductively:

- If the length of  $x$  is 0, then  $x^{\text{rev}}$  is also an empty string.
- If  $x = za$ , where  $z$  is a string and  $a$  is a single character  $\rightarrow x^{\text{rev}} = az^{\text{rev}}$

Proof using induction:

- Both sides of the equation are empty strings  $\rightarrow$  trivially equal
- strings of length  $n \rightarrow n+1 \rightarrow x = za$   $\begin{matrix} z \rightarrow \text{length of } n \\ a \rightarrow \text{single character} \end{matrix}$

$$xy^{\text{rev}} = za^{\text{rev}}y^{\text{rev}} = ayz^{\text{rev}}$$

$$ayz^{\text{rev}} = a^{\text{rev}}y^{\text{rev}}z^{\text{rev}}$$

$$z^{\text{rev}}y^{\text{rev}}a^{\text{rev}} = z^{\text{rev}}y^{\text{rev}}a^{\text{rev}}$$

$$x^{\text{rev}} = za^{\text{rev}} = a^{\text{rev}}z^{\text{rev}}$$

$$a^{\text{rev}}z^{\text{rev}} = az^{\text{rev}}$$