

## Quiz 4

● Graded

Student

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Total Points

5 / 5 pts

Question 1

(no title)

5 / 5 pts

✓ + 1 pt  $r+r' = r'$  {above defn}-----1 mark

✓ + 1.5 pts  $(r+r').r2 = r'.r2$  {sequentially composition of  $r2$  reg ex on both side}-----1.5 mark

✓ + 1.5 pts  $(r.r2) + (r'.r2) = r'.r2$  {right distributive}-----1.5 marks

✓ + 1 pt  $(r.r2) \leq r'.r2$  {above defn}-----1 mark

+ 0 pts Incorrect

## Q1

5 Points

From the definition  $r \leq r'$  if and only if  $r + r' = r'$  over regular expressions, show that the "sequential composition" operation  $\cdot$  is "right monotone": If  $r \leq r'$  then  $r \cdot r_2 \leq r' \cdot r_2$ .

[Note: For convenience write "r2" for  $r_2$ , "<=" for  $\leq$  and "iff". Write the reason for each step ("def of \_\_") or (the abbreviated name of the equational law) ]

$r \leq r'$  (Given)  
-->  $r + r' = r'$  (Definition of  $\leq$ )  
-->  $(r+r')r_2 = r' r_2$   
-->  $rr_2 + r'r_2 = r'r_2$  (Distributive property)  
-->  $r r_2 \leq r' r_2$  ( from definition of  $\leq$ )  
Since  $r_2$  is arbitrary,  $\leq$  is right monotone.