

# Verilog Assignment 5 Report

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**Question:** Do calculate  $x/255$  for a given 32 bit input  $x$  without using division or multiplication in Verilog

**Formula derived and used:**  $y = x \gg 8 + x \gg 16 + x \gg 24;$

This is based upon the fact the  $255 = 256 - 1$ .

$y = x/255 = x/(256-1) = (x/256)(1-1/256)^{-1} = x/256 + x/256^2 + x/256^3 + \dots$

Since  $x$  is only 32 bits,  $x/256^4 = 0$  and same with higher powers.

Hence  $y = x \gg 8 + x \gg 16 + x \gg 24;$

## Method:

- Define the usual adder and shifter module
- In the top module, we use an always block to iteratively calculate the temporary right shifted value of  $x$  and add it to  $y$ .
- After 3 such iterations, our  $y$  stores the correct output

