EE 789
Assignment 1: Aa assignment

September 5, 2023

1. Implement an 8-bit multiplier (which multiplies two 8-bit unsigned numbers) using a shift and add multiplier algorithm. The module is

```
$module [shift_and_add_mul]
      $in (a b: $uint<8>)
      $out (product: $uint<16>)
$is
{
  //..... write your stuff here ......
}
```

   (a) Describe the algorithm using Aa, and write a testbench for the design.

   (b) Generate the VHDL and verify it using the GHDL simulator and the C test-bench.

   (c) Study the generated VHDL and sketch the structure of the generated hardware (show the modules, their internal structure, and their interactions as you observe them in the VHDL)

2. Design a shift and subtract (long-division) 8-bit (unsigned) divider in RTL.

```
$module [shift_and_subtract_div]
      $in (a b: $uint<8>)
      $out (quotient: $uint<8>)
```

```
$is
{
  //..... write your stuff here ......
}
```

(a) Describe the algorithm using Aa, and write a testbench for the design.

(b) Generate the VHDL and verify it using the GHDL simulator and a testbench.