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--------------------------------------------------------------------------------
-- TEST BENCH --
--------------------------------------------------------------------------------

LIBRARY IEEE;
USE IEEE.STD_LOGIC_1164.ALL;
USE IEEE.NUMERIC_STD.ALL;

-- Input 16 bit signal is a fixed point number of the form:
-- 000.0000000000000
-- 3 bits before decimal: Integral part
-- 13 bits after decimal: Fractional part

-
- NOTE: the input range lies in [0, 2] due to the nature of ln(x)'s taylor exp
ansions

ENTITY sine_tb IS
END sine_tb;

ARCHITECTURE Sequential OF sine_tb IS

    COMPONENT sine IS
        PORT (
            A : IN std_logic_vector(15 DOWNTO 0);
            S : OUT std_logic_vector(31 DOWNTO 0)
        );
    END COMPONENT;

    --Inputs
    SIGNAL A : std_logic_vector(15 DOWNTO 0);

    --Output
    SIGNAL S : std_logic_vector(31 DOWNTO 0);

BEGIN
    dut : sine
    PORT MAP(
        A => A,
        S => S
    );

    -- Stimulus process
    stim_proc : PROCESS
    BEGIN
        --A <= "000-0000000000000"; -- 0 degrees = 0 radian

        A <= "0000000000000000"; -- 0 degrees = 0 radian
```

```
        WAIT FOR 100 ns;
        A <= "0000100001100000"; -- 15 degrees = 0.261799 radian
        WAIT FOR 100 ns;
        A <= "0001000011000001"; -- 30 degrees = 0.523599 radian
        WAIT FOR 100 ns;
        A <= "0001100100100001"; -- 45 degrees = 0.785398 radian
        WAIT FOR 100 ns;
        A <= "0010000110000010"; -- 60 degrees = 1.0472 radian
        WAIT FOR 100 ns;
        A <= "0010100111100011"; -- 75 degrees = 1.309 radian
        WAIT FOR 100 ns;
        A <= "0011001001000011"; -- 90 degrees = 1.5708 radian
        WAIT FOR 100 ns;
        A <= "0011101010100100"; -- 105 degrees = 1.8326 radian
        WAIT FOR 100 ns;
        A <= "0100001100000101"; -- 120 degrees = 2.0944 radian
        WAIT FOR 100 ns;
        A <= "0100101101100101"; -- 135 degrees = 2.35619 radian
        WAIT FOR 100 ns;
        A <= "0101001111000110"; -- 150 degrees = 2.61799 radian
        WAIT FOR 100 ns;
        A <= "0101110000100111"; -- 165 degrees = 2.87979 radian
        WAIT FOR 100 ns;
        A <= "0110010010000111"; -- 180 degrees = 3.14159 radian
        WAIT FOR 100 ns;
        A <= "0111010101001001"; -- 210 degrees = 3.66519 radian
        WAIT FOR 100 ns;
        A <= "0111110110101001"; -- 225 degrees = 3.92699 radian

        WAIT;
    END PROCESS;

END;
```