

**Question 1** - Write a PROCEDURE that has an input parameter of eight INTEGER values and returns their average, the largest value, and the lowest value. Call the return values ave, max, and min. Place your procedure in a package. Then write an application with a call to it in order to test its functionality. To help you out I'm including a test bench that is used to test my solution. As you can see you NEED an external package that contains the matrix datatype (which is just an array of integers).

```
library ieee;
use ieee.std_logic_1164.all;
use ieee.std_logic_arith.all;
USE work.my_package.all;

entity testadder is
end;

architecture bench of testadder is
  component topLevel is
    port ( x : in matrix;
          max, min, average : out integer);
  end component;

  signal x : matrix;
  signal max, min, average : integer;

begin
  x <= (10,23,12,33,44,22,34,9), (21,243,212,333,4,212,34,9) after 10ns ;

  m: topLevel port map (x,max,min,average);

end bench;
```

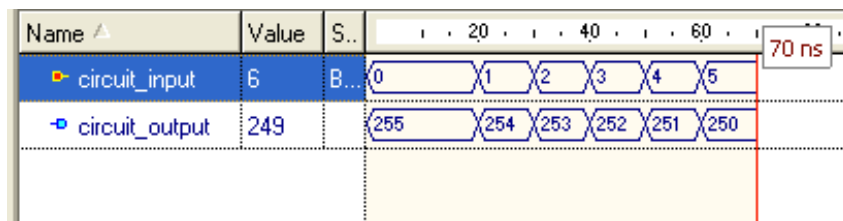
Name ▲	Value	S...	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
average	133		23												133							
max	333		44												333							
min	4		9												4							
x	[21,2...		[10,23,12,33,44,22,34,9]										[21,243,212,333,4,212,34,9]									

**Question 2** - Overloaded “not” Operator: The NOT operator allows the inversion of binary values. For example, if x=“1000” is a STD\_LOGIC\_VECTOR value, then NOT x could be used, producing “0111”. However, if x had been declared as an INTEGER, such operation would not be allowed. Write a “not” function capable of inverting integers.

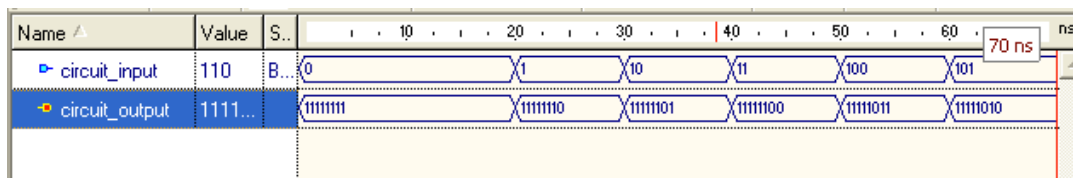
You do not have to create a package for this function. Use the following entity:

```
entity main_block is
port (circuit_input : in integer range 0 to 255;
      circuit_output : out integer range 0 to 255
);
end entity;
```

To help you out, this is some possible output you might get:



Or in binary,



**Question 3** - Write a function capable of logically shifting a STD\_LOGIC\_VECTOR signal to the left by a specified amount. Two arguments must be passed to the function: the value to be shifted (STD\_LOGIC\_VECTOR), plus a INTEGER value specifying the amount of shift. Place your function in a package. Then write an application with a call to your function in order to test it.