module tan(In,Out,Sign);

input [19:0]In;

input Sign;

output [19:0]Out;

wire [19:0]sg\_out;

sigmoid sg(In<<1,sg\_out,Sign);

assign Out = (In>=20'd327680)?20'd65536:(sg\_out<<1) - (20'd65536);

endmodule

module sigm\_tb();

reg [19:0]x ;

reg sign;

wire [19:0]y ;

tan s(x,y,sign) ;

initial

begin

sign = 1'b0;

x=20'd000000;

#50

x=20'd183500;

#50

x=20'd229376;

#50

x=20'd401198;

#50

sign = 1'b1;

x=20'd8192;

#50

x=20'd49152;

#50

x=20'd108134;

#100

$finish;

end

endmodule