Name:_____ **Section:** ○ M1 ○ T1

Homework Assignment: Submit via gradescope

1. In this problem, you will build a VHDL entity called **scancode decoder** which processes keyboard scancodes. When you press a key on a keyboard, the keyboard sends an 8-bit code to the computer called a PS2 scancode. Each key has its own scancode listed below. The relationship between the keys and their scancode is not based on ASCII nor any other discernible pattern.

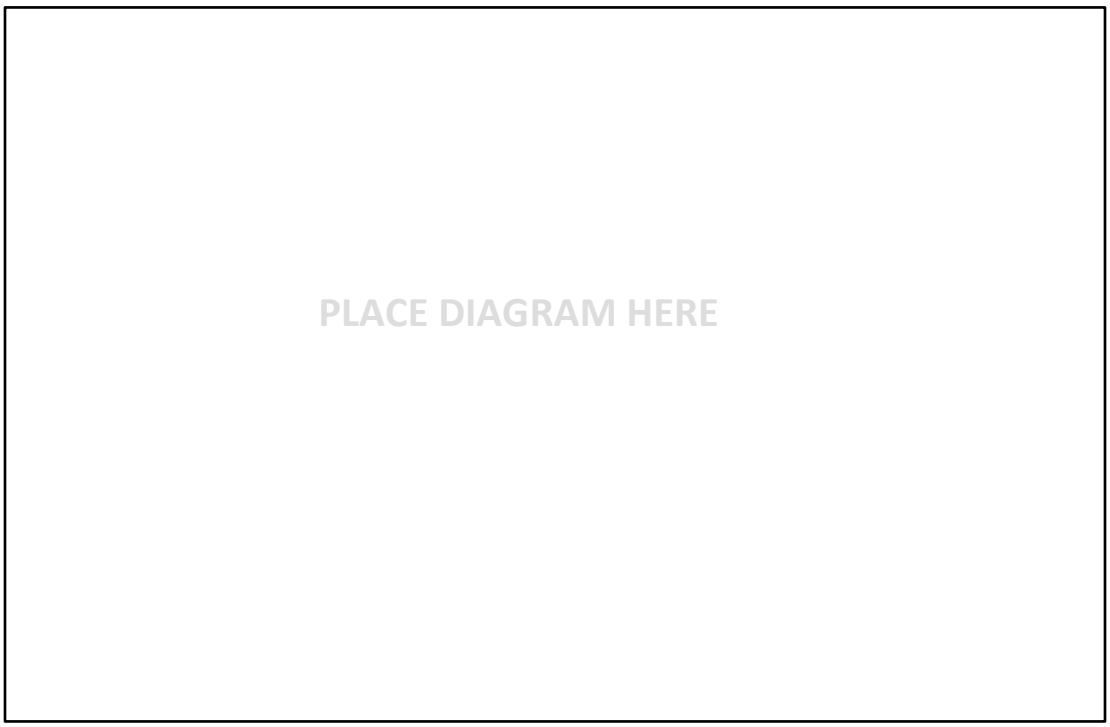
Keyboard Key	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Scancode (in hex)	0x45	0x16	0x1E	0x26	0x25	0x2E	0x36	0x3D	0x3E	0x46

Build a component which converts an 8-bit scancode for the digits 0-9 into a 4-bit hexadecimal values.

Nomenclature:	**scancode_decoder**
Data Input:	scancode = std_logic_vector(7 downto 0);
Data Output:	decoded_value = std_logic_vector(3 downto);
Control:	none
Status:	none
Behavior:	Converts scancode, representing a keypress of a decimal digit, into its 4-bit value. For example, if scancode = 25_{16}, the scancode for the character "4", then the converter should output decoded_value = 0100_2. Assume that the inputs are always legal hexadecimal scancodes.

Use the ***when*** statement syntax to describe the output in terms of the input.

a. Create a testbench to simulate and demonstrate your function works for all 10 values in the first table. Provide a cropped screenshot of the resulting simulation timing diagram below - make the signal values legible.



b. In Github, provide the VHDL code for your **Scancode decoder** component and testbench.