❖ Problem Set 6:

Problem Set due Jul 31, 2023 20:06 PDT Completed

Fixed Point

1/1 point (graded)

Write 9.0625 as a Q7.5 fixed-point number. Be sure your answer is 12 bits long including leading 0s. Do not include a binary point.

000100100010 ✔

000100100010

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Negative Fixed Point

1/1 point (graded)

Write -9.0625 as a Q7.5 fixed-point number. Be sure your answer is 12 bits long including leading 0s. Do not include a binary point.

111011011110 ✔

111011011110

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Floating Point to Decimal

1/1 point (graded)

Write the decimal value of the IEEE single-precision floating-point number 0×41200000.

10.0 ✔

10.0

Submit You have used 1 of 2 attempts Save | Show answer

Floating Point Addition

1/1 point (graded)

Compute the sum of the following two IEEE single-precision floating-point numbers by hand: 41200000 + 40D80000. Express your answer as another floating-point number using 8 hexadecimal digits and no leading 0x.

41860000 ✔

41860000

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Problem Set due Jul 31, 2023 20:06 PDT Completed

How many Cyclone IV Logic Elements (LEs) are required to build each of the following functions?

NOR2

1/1 point (graded)

NOR2

1 ✔

1

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OR8

1/1 point (graded)

OR8

3 ✔

3

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4:3 Priority Encoder

1/1 point (graded)

A 4:3 priority encoder with 4 inputs and 3 outputs.

3 ✔

3

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FSM

1/1 point (graded)

Arbitrary Mealy FSM with 3 states, 1 input, and 1 output.

3 ✔

3

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Counter

1/1 point (graded)

8-bit counter with reset and enable

8 ✔

Answer
Correct: Spiffy!

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Problem Set due Jul 31, 2023 20:06 PDT Completed

You will be building embedded systems with the SparkFun RED-V Thing Plus development board containing a Freedom E310 RISC-V microcontroller. Refer to the processor data sheet and user manual below as you answer questions to get to know the microcontroller.

Freedom E310 Datasheet

Power Supplies

1/1 point (graded)

What power supply voltages does this E310 chip require?

- ○ 1.8 V only
- ○ 2.5 V only
- ○ 3.3 V only
- ○ 5 V only
- ◉ 1.8 V to run the core and phase locked loop, and 3.3 V to run the input/output pins and always-on logic ✔

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Power Supply Current

1/1 point (graded)

What is the typical power supply current on the 1.8V supply when the processor operates at 16 MHz? Express your answer in mA.

8 ✔

8

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Power Supply Current

1/1 point (graded)

What is the typical power supply current on the 1.8V supply when the processor operates at 250 MHz? Express your answer in mA.

150 ✔

150

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VIL

1/1 point (graded)

What is V_IL?

0.8 ✔

0.8

Submit You have used 1 of 2 attempts Save | Show answer

VIH

1/1 point (graded)

What is V_IH?

1.0 ✔

1.0

Submit You have used 1 of 2 attempts Save | Show answer

VOL

1/1 point (graded)

What is V_OL? Assume the I/O pin is driving 20 mA of output current and the drive strength is set low (DS = 0). Express your answer in volts.

0.38 ✔

0.38

Submit You have used 1 of 2 attempts Save | Show answer

VOH

1/1 point (graded)

What is V_OH? Assume VDDIO = 3.3 V the I/O pin is driving 20 mA of output current and the drive strength is set low (DS = 0). Express your answer in volts, relative to ground.

2.90 ✔

2.90

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Output Current

1/1 point (graded)

Suppose you need to drive an LED as brightly as you can. How much output current can the chip typically provide? Use the high drive strength setting (DS=1). Express your results in mA. The sign of the current just indicates whether it is flowing into or out of the chip, so consider only the magnitude.

21 ✔

21

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Current-limiting resistor

1/1 point (graded)

Suppose the voltage drop across the LED is 2.0 V when it is on, and the output voltage of the chip is 3.0 V. What is the smallest resistor should you use to limit the current to not exceed 20 mA? Express your answer in ohms.

50 ✔

50

Submit You have used 1 of 2 attempts Save | Show answer

Input Leakage

1/1 point (graded)

What is the maximum input leakage current the chip may draw on an input pin? Express your answer in pA.

200 ✔

200

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Pullup Resistor

1/1 point (graded)

Suppose you connect an input pin to a SPST switch. The switch is connected between the pin and ground. A pullup resistor is connected betwen the pin and IVDD (3.3 V). What is the largest resistor that could be used while insuring a legal logic level, accounting for input leakage. Express your answer in ohms.

11.5E9 ✔

11.5×10^9

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Max Clock Frequency

1/1 point (graded)

What is typically the maximum operating frequency of the FE310? Express your answer in MHz.

320 ✔

320

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