

Dept. of Electrical Engineering and Computer Science  
EECS2021  
Computer Organization  
Quiz 1 – 25 minutes  
Oct. 11 2017

Name \_\_\_\_\_

ID \_\_\_\_\_

**Question 1 – 6 points**

- a) Represent -15 using 2's complement using the minimum number of bits

**10001**

- b) Represent the number 9 in 2's complement format using the minimum number of bits

**01001**

- c) Perform the operation  $-15+9$  using 2's complement, what is the result? Show your work below

**-15 = 10001**

**9 = 01001**

**= 11010**

What does the following instruction do?

`jalr x0, 0(x1)`

**Jump to location in register x1**

## Question 2 – 4 points

A processor spends 10% of its time doing integer operation, 30% doing memory load/store, 25% doing floating point operations, and 35% in branching instructions.

If you can only reduce the time of one category of instructions by 25%, which one do you choose to maximize performance?

**Branching, since the processor spends most of its time in branching**

What is the resulting speedup?

$$T_{\text{before}} = 0.1 + 0.3 + 0.25 + 0.35 = 1$$

$$T_{\text{after}} = 0.1 + 0.3 + 0.25 + 0.35 * 0.75 = 0.9125$$

$$\text{Speedup} = 1/0.9125 = 1.096$$

