HW 13: Processor Performance

1) Processor A runs program P in 30 seconds executing $12 \cdot 10^9$ instructions. Half of these are ALU instructions, a quarter are data transfer (load or store) instructions, and a quarter are branch instructions. Execution of the ALU and branch instructions require 4 cycles each. Execution of load and store instructions require 6 cycles each. What is the clock speed of processor A in GHz (billions of cycles per second)?

2) On processor B every instruction takes 3 cycles to execute. The clock for processor B is twice as fast as processor A's clock. How long does it take processor B to execute program P?

3) What is the relative performance of processor B to processor A?