Review Problem 2

- If a 200 MHz machine runs ½ billion instructions in 10 seconds, what is the CPI of the machine?

200 MHz × 10s = 2B cycles

2B cycles / 0.5B inst = 4 $\frac{\text{cycles}}{\text{instr.}}$

- If a second machine with the same CPI runs the program in 5 seconds, what is it's clock rate?

400 MHz

Review Problem 3

- A program is 20% multiplication, 50% memory access, 30% other. You can quadruple multiplication speed, or double memory speed
  - How much faster with 4x mult:

$$\text{Speedup} = \frac{1}{.5 + .3 + .05} = \frac{1}{.85} = \boxed{1.18x}$$

  - How much faster with 2x memory:

$$\text{Speedup} = \frac{1}{.2 + .25 + .3} = \frac{1}{.75} = \boxed{1.33x}$$

  - How much faster with both 4x mult & 2x memory:

$$\text{Speedup} = \frac{1}{.05 + .25 + .3} = \frac{1}{.6} = \boxed{1.67x}$$