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Lab 4: REPORT_perf

1. Add a PDF file REPORT_perf.pdf that reports your performance and performance-per-Watt results for the 3 benchmark inputs: benchmarks/mixed.c, benchmarks/mmmRV32IM.c, and benchmarksO3/mmmRV32IM.c.
   a. To calculate instructions-per-second, use simulation to collect instructions-per-cycle for each benchmark input and look in the Synopsys synthesis report to find cycles-per-second. To calculate instructions-per-second-per-Watt, look in the Synopsys synthesis report to find the total power ("Total Dynamic Power" + "Cell Leakage Power").
      i. Total Dynamic Power: 771.8488 mW
      ii. Cell Leakage Power: 33.392 uW
      iii. Total Cell area: 5112294.3310
   b. In a table, report (1) instructions-per-cycle, (2) instructions-per-second, (3) instructions-per-second-per-Watt. Report separately for each of the 3 benchmark inputs and as weighted average over 2 benchmark inputs benchmarks/mmmRV32IM.c and benchmarksO3/mmmRV32IM.c (assume they occupy the processor for the same fraction of the time). These weighted averages are used for determining the competition portion of the lab score. (Show and explain this calculation.)

	mixed	**mmmRV32IM**	**mmmRV32IM03**
Num cycles Elapsed	41103	70360	25231
Num Instr Fetched	32995	43093	19743
Num Instr Exec'd	30712	42102	19589
IPC	0.7471474102	0.598351336	0.776306924
MIPS	172.5513649	138.1873755	179.2856637
MIPS/watt	223.5300247	179.0135214	232.2539081

Benchmark Weights (mmmRV32I*)	
Total Instr.	61691
Weighted IPC	0.6548583145
Weighted MIPS	151.237486
Weighted instructions-per-second-per-Watt	195,919,163

       i.   Each of the benchmarks is weighted by the number of instructions that benchmarks computes over the total number of instructions being computed by both benchmarks. For instance the Weighted IPC is computed as follows:

$$\text{Weighted IPC} = \left(\frac{mmmO3\_instr\_ct}{TotalInstr}\right)(mmmO3\_IPC) + \left(\frac{mmm\_instr\_ct}{TotalInstr}\right)(mmm\_IPC)$$
$$\text{Total Instr} = mmmO3\_instr\_ct + mmm\_instr\_ct$$

    c.   In a similarly formatted second table, report the gain/loss for each of the 3 benchmark inputs relative to your Lab 3 implementation.

Comparison with Lab3	(Amount decreased from Lab3)			
	mixed	**mmmRV32IM**	**mmmRV32IMO3**	
Delta(IPC)	-0.1004926671	-0.2237216157	-0.2175030105	
Delta(MIPS)	-24.57423443	-52.99238068	-51.83292568	
Delta(inst per sec per Watt)	-378,200,142.7	-404,566,830.7	-473,240,598.7	