Problem 1: Consider three ISAs: IA-32 (or 64), IBM POWER6, and Sun SPARC.

(*a*) Choose the highest-performing system, based on SPECint2006, for each ISA. Print or provide a link to the test disclosure for each one.

The highest performing IA-32 (loosely defined) implementation is the Xeon X5570 at 3.33 GHz achieving a peak score of 36.3: `http://spec.org/cpu2006/results/res2009q1/cpu2006-20090316-06691.html`

The highest performing POWER implementation is the POWER6 at 4.2 GHz achieving a peak score of 19.2: `http://spec.org/cpu2006/results/res2008q3/cpu2006-20080623-04639.html`

The highest performing SPARC implementation is the SPARCVII at 2.52 GHz achieving a peak score of 12.6: `http://spec.org/cpu2006/results/res2008q4/cpu2006-20081023-05678.html`

(*b*) Find examples of benchmarks (if any) which favor each ISA based on the test disclosures you found.

There are two ways to answer this question: is a benchmark faster on one system than on the other two, or does a benchmark help one system's score more than the other two.

The Xeon X5570 system runs each of the benchmarks faster than the other two systems and so in the first sense all benchmarks favor the X5570 system (and so no benchmarks favor the POWER6 or SPARCVII systems).

For the second sense consider the perlbench benchmark. On the SPARCVII system perlbench's peak ratio, 14.3, is above the overall peak score of 12.6 and so perlbench is helping the SPARCVII. On the other systems the perlbench peak score is below the overall peak score and so perlbench favors the SPARCVII system. (That's not true when looking at base scores.) Another benchmark favoring SPARCVII is xalancbmk.

The mcf benchmark favors the POWER6 system, where mcf's peak score is 50% higher than the overall peak score. On the other systems mcf's peak score is above the overall peak score, but by less than 50%.

The X5570 is favored by libquantum with a peak score over 8.5 times higher than the overall peak. The other systems trounce the reference system on libquantum too, but for them the peak scores are 4.4 times higher (for POWER6) and 2.5 times higher (SPARCVII).

Problem 2: Why might a company publish peak SPECcpu scores but not base? Why is it against the rules?

One reason to publish peak but not base is because peak is much higher than base, the difference indicates that it takes great skill or care to achieve the peak score performance, an effort that many users won't or can't make.

It is against the rules because some users might be mislead into believing that they can achieve the same performance with normal program development effort.

Problem 3: Solve the Fall 2008 Final Exam Problems 1 and 2.

See the posted final exam solution.