

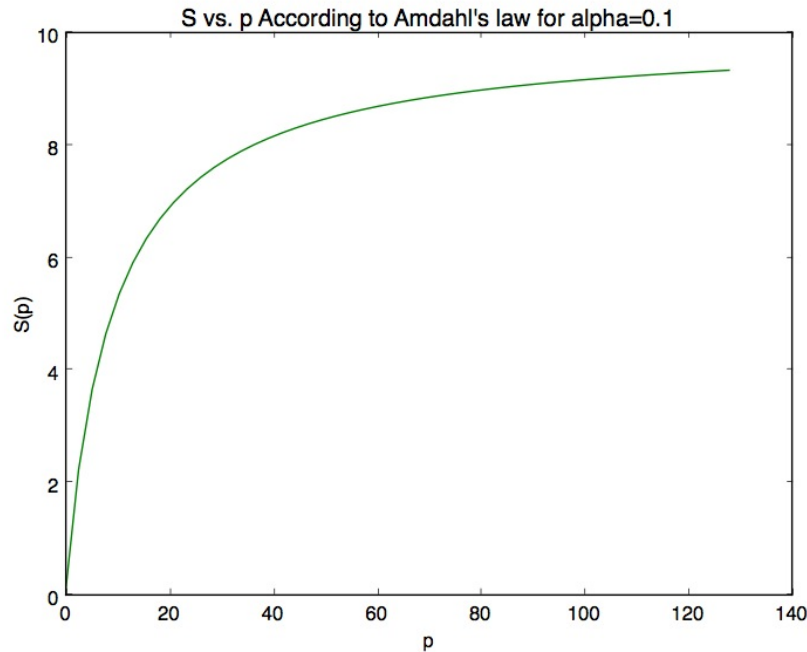
## CS 5220 Pre-Class Questions 1

Ian MacCormack

August 27, 2015

### Question 1

Using Python to generate a plot of Amdahl's law, and matplotlib to plot the resulting graph, we obtain the following:



### Question 2

According to Gustafson's law,  $S(p) = p - T * (p - 1)$ , where  $T = \alpha / (\alpha + \tau)$ .

### Question 3

Though it may be tempting, fine tuning the performance of code is sometimes counterproductive. If one spends several hours reducing the runtime of a program from ten minutes to one minute, and the resulting code is run only a single time, tuning was clearly unwarranted. Tuning at the expense of code readability or robustness is also ill-advised. Finally, if the majority of a program's runtime is spent in serial bottlenecks, tuning is unlikely to be worthwhile.

### Question 4

According to the Intel Xeon Phi data sheet on this page "<https://www.microway.com/download/datasheet/>", the intel 5110P coprocessor has a theoretical maximum of 1.01 TFLOPS.

$$(1.01 \text{ TFLOPS/Board}) * (15 \text{ boards}) = 15.15 \text{ TFLOPS}$$

### Question 5

I have an 11" MacBook Air with dual 1.3 GHz i5 Haswell processors. They can each do 4 FLOPs per cycle, yielding a total FLOP count of

$$2 * 1.3 * 4 = 10.4 \text{ GFLOPS}$$