M/CS 375 HW 10

Isaac Boaz

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Problem 6

Assume that your computer completes a 5000 equation back substitution in 0.005 seconds. Use the approximate operation counts n^2 for back substitution and $2n^3/3$ for elimination to estimate how long it will take to do a complete Gaussian elimination of this size. Round your answer to the nearest second.

$$\begin{aligned}
\frac{5000^2}{2 \cdot 5000^3/3} &= \frac{0.005}{x} \\
\frac{3}{2} \cdot \frac{5000^2}{5000^3} &= \frac{0.005}{x} \\
\frac{3x5000^2}{2 \cdot 5000^3} &= 0.005 \\
x &= \frac{2 \cdot 5000^3 \cdot 0.005}{3 \cdot 5000^2} \\
x &= 16.\bar{6} \to 17 \text{ seconds}
\end{aligned}$$