

# M/CS 375 HW 11

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## Problem 8

If a system of 3000 equations in 3000 unknowns can be solved by Gaussian elimination in 5 seconds on a given computer, how many back substitutions of the same size can be done per second?

$$\begin{aligned}\frac{s_b^2}{2 \cdot s_e^3/3} &= \frac{t_b}{t_e} \\ s_e &= 3000 \\ t_e &=? \\ s_b &= 3000 \\ t_b &= 5 \\ \frac{3000^2}{2 \cdot 3000^3/3} &= \frac{t_b}{5}\end{aligned}$$

Simplifying the above, we get  $t_b = \frac{1}{400}$  seconds, meaning it would take 1/400th of a second to do one back substitution. (I.e: we can do 400 back substitutions / second).