Free Response – Spring 2021 – LU Decomposition Method

1) A 2000×2000 matrix $[A]$ is decomposed into a LU form by using the forward elimination steps of Gaussian elimination. It is given that it takes 16 seconds of computational time to conduct the LU decomposition of $[A]$.

a) Find the approximate computational time in seconds it would take to do the LU decomposition of a 6000×6000 matrix $[B]$.

b) Find the approximate computational time it would take to find the inverse of the 2000×2000 matrix $[A]$ by using LU decomposition route.

$$CT|_{DE} = T\left(\frac{8n^3}{3} + 4n^2 - \frac{20n}{3}\right)$$

$$CT|_{FS} = T(4n^2 - 4n)$$

$$CT|_{BS} = T(4n^2 + 12n)$$

$$CT|_{FE} = T\left(\frac{8n^3}{3} + 8n^2 - \frac{32n}{3}\right)$$

Answer

a) $432\ s$
b) $64\ s$