

1. Carry out Gaussian Elimination with partial pivoting to find P, L, U for

$$A = \begin{pmatrix} 2 & 1 & 3 \\ 1 & 1 & 2 \\ 4 & 1 & 2 \end{pmatrix}.$$

2. Let A be $m \times n, m \geq n$. Show that $\|A^T A\|_2 = \|A\|_2^2$ and that $\kappa_2(A^T A) = \kappa_2(A)^2$.
3. Show that if a matrix is triangular and orthogonal, then it is diagonal.
4. Derive an approximation flop count for code.

```
s=0
for k=1:n
    for j=k:n
        s=s+k+j
    end
end
end
```

5. Prove that

$$\|x\|_\infty \leq \|x\|_2$$

for all vectors x of length n .