Tutorial 4

Numbers

Question 1: Simple Proof

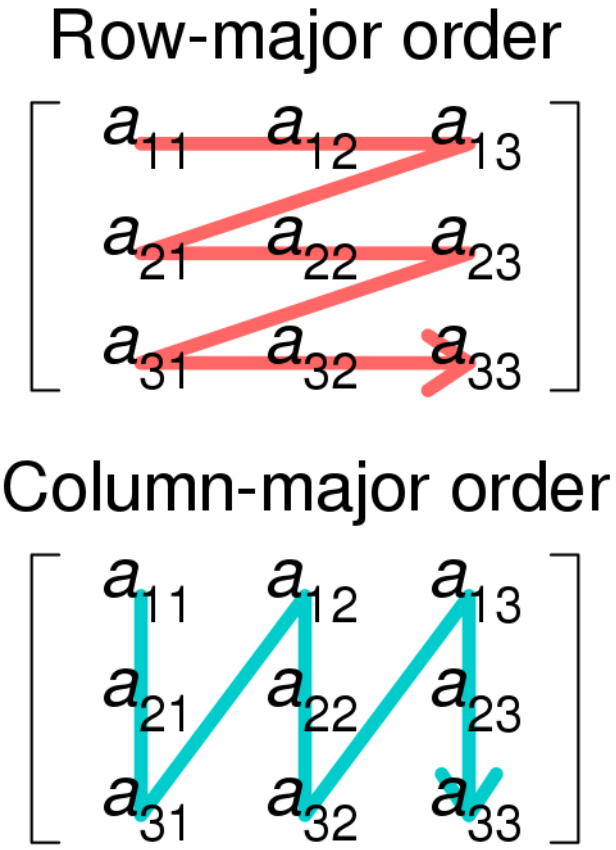
- Prove that for all integers a, b, and c, if $a|b$ and $a|c$, then $a|(b + c)$.

Question 2: Simple Proof

- Prove that the square of any odd integer has the form $8m + 1$ for some integer m.

Question 3: Data Storage

- In computing, row-major order and column-major order are methods for storing two-dimensional array in linear storage such as RAM or hard disk.



Question 3: Data Storage

- A matrix M has 3 rows and 4 columns.

$$\begin{bmatrix} a_{11} & a_{12} & a_{13} & a_{14} \\ a_{21} & a_{22} & a_{23} & a_{24} \\ a_{31} & a_{32} & a_{33} & a_{34} \end{bmatrix}$$

- The 12 entries in M are to be stored in row major order in locations 7,609 to 7,620 in a computer's memory.

a) Which location will a_{22} be stored in?

b) Write a formula (in i and j) for the location in which a_{ij} is stored.

c) Find formulas (in n) for r and s so that a_{rs} is stored in location 7,609 + n.

Question 4: Euclidean Algorithm

- Compute gcd(65432, 8642).

Question 5: Extended Euclidean Alg.

- Find a solution in integers to the equation

$$65432x + 8642y = \gcd(65432, 8642).$$