Row Reduction of small integer Matrices

Optimized to prevent arithmetic errors in manual calculation

Check whether the matrix is row reduced, keep integer values as small as possible.

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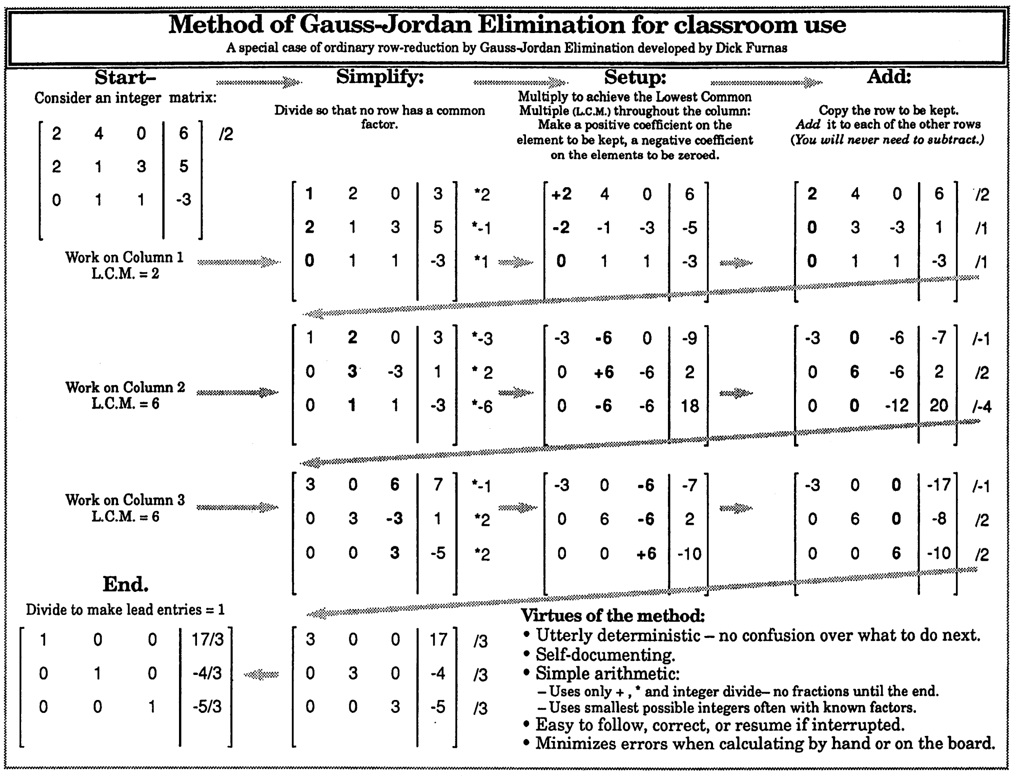
For each row:
   1. Find first non-zero element
   2. If all other elements in the column = 0;
       go to next row;
       else make them = 0.
Permute rows to echelon form
Normalize first element in each row to 1
```



Notes for Linear Algebra:

Express as a sequence of three matrix multiplications per pivot column zeroed.

0.	**Begin: The (*optionally*) Augmented matrix: A_0**				
1.	**Operation:**	*Setup* (Multiply):	*Add* (Pivot row):	*Simplify*(Divide):	$= A_{PivotCol}$
2.	**Start** by *Simplify*ing (Divide rows by any common factors):			D_0A_0	$= A_1$
3.	**Zero Column 1:**	M_1A_1	$P_1M_1A_1$	D_1A_1	$= A_2$
4.	**Zero Column 2:**	M_2A_2	$P_2M_2A_2$	D_2A_2	$= A_3$
5.	**Zero Column 3:**	M_3A_3	$P_3M_3A_3$	D_3A_3	$= A_4$
6.	**End** by *Simplify*ing (Divide rows by pivot values to get 1 in pivot position):			D_4A_4	$= A_{rr}$
7.	**Behold!**	A_0 *is now completely row-reduced to* A_{rr}			

Discover:

0. An invertible Diagonal Matrix can be built from the Identity Matrix using elementary row operations.
1. The determinant of a diagonal matrix.
2. *Simplify*: Divides rows using a diagonal matrix $\mathbf{D_n}$
3. *Setup*: Multiplies rows using diagonal matrix $\mathbf{M_n}$
4. *Add*: Adds the Pivot row n to other rows as necessary $\mathbf{P_n}$
   a. What does $\mathbf{P_n}$ look like?
   b. How can $\mathbf{P_n}$ be built from elementary row operations?
   c. What is the determinant of $\mathbf{P_n}$?
5. What elementary row operation(s) is (are) not included in this development?
   a. What is the determinant of the matrix representing such operation(s)?
6. If $\mathbf{A_0}$ Reduces to the Identity Matrix, express the inverse of $\mathbf{A_0}$ as a composition of the matrices used.