Assignment 2

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Q. 1 Implement a `Point` class for three-dimensional points (x, y, z). Include

- an overridden default constructor,
- a copy constructor,
- a formatted constructor,
- a `negate()` function to transform the point into its negative,
- a `norm()` function to return the point's distance from the origin $(0, 0, 0)$, and
- a `print()` function.

Q. 2 Implement a `Matrix` class for 3×3 matrices:

$$\begin{pmatrix} a & b & c \\ d & e & f \\ g & h & i \end{pmatrix}$$

- Include a default constructor,
- a copy constructor,
- an `inverse()` function that returns the inverse of the matrix,
- a `det()` function that returns the determinant of the matrix,
- a Boolean function is `Singular()` that returns 1 or 0 according to whether the determinant is zero, and
- a `print()` function.

Q. 3 A queue is a data storage device much like a stack. The difference is that in a stack the last data item stored is the first one retrieved, while in a queue the first data item stored is the first one retrieved. That is, a stack uses a last-in-first-out (LIFO) approach, while a queue uses first-in-first-out (FIFO). A queue is like a line of customers in a bank: The first one to join the queue is the first one served.

Both a queue and a stack use an array to hold the data. However, instead of a single int variable called top, as the stack has, you'll need two variables for a queue: one called head to point to the head of the queue, and one called tail to point to the tail. Items are placed on the queue at the tail (like the last customer getting in line at the bank) and removed from the queue at the head. The tail will follow the head along the array as items are added and removed from the queue. This results in an added complexity.

Rewrite the STAKARAY program from this chapter to incorporate a class called `queue` instead of a class called `stack`. Besides a constructor, it should have two functions: one called `put()` to put a data item on the queue, and one called `get()` to get data from the queue. These are equivalent to `push()` and `pop()` in the `stack` class.