NOTE: this is the SOLUTION to Quiz 8.

The correct answers are indicated for each question, with explanations as needed.

Dr. Manikas

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1 4 / 4 points

Examples of high-level programming languages that use **Column-Major Mapping** for array storage in memory include (check all that apply):

- [x] MATLAB
- [ ] C++
- [ ] Python
- [x] Fortran

Feedback

General Feedback

- Row-Major Mapping
  - Used in C/C++, Python
- Column-Major Mapping
  - Used in Fortran, MATLAB

2 4 / 4 points

Assume that we have the following matrix that we wish to store in main memory:

$$\begin{bmatrix} A11 & A12 & A13 \\ A21 & A22 & A23 \\ A31 & A32 & A33 \end{bmatrix}$$

The matrix elements are stored in main memory as shown below, with the first matrix element stored in main memory location 0. The matrix elements are stored in _____ order.

0	A11
1	A12
2	A13
3	A21
4	A22
5	A23
6	A31
7	A32
8	A33

- Column Minor
- Row Minor
- Column Major
- ✓ (●) Row Major

3 4 / 4 points

We have a 32 x 32 matrix whose elements are stored as double-precision numbers. Given that the IEEE floating-point standard for double-precision numbers (64 bits) is used for each matrix element, how many **bytes** are required to represent each matrix element?

✓ 8

Feedback

General Feedback

The IEEE floating-point standard for double-precision numbers is 64 bits. There are 8 bits/byte, so each matrix element requires (64 bits) / (8 bits/B) = 8 B.

4 4 / 4 points

An ensemble of hardware resources for performing vector operations is called:

- ✓ (●) A vector processor
- ( ) A reorder buffer
- ( ) A vector
- ( ) Vector processing

Feedback

General Feedback

- Vector processor - an ensemble of hardware resources, including vector registers, functional pipelines, processing elements, and register counters for performing vector operations

5 4 / 4 points

We have VMIPS code with 4 convoys. How many **chimes** will this sequence take?

- ✓ 4

Feedback

General Feedback

Recall that each convoy takes 1 chime.

We have **4** convoys, so this sequence will take **4 chimes**.