Student Name: _____ Student ID # _____

UOSA Statement of Academic Integrity

On my honor I affirm that I have neither given nor received inappropriate aid in the completion of this exercise.

Signature: _____ Date: _____

Notes Regarding this Examination

Open Book(s) You may consult any printed textbooks in your immediate possession during the course of this examination.

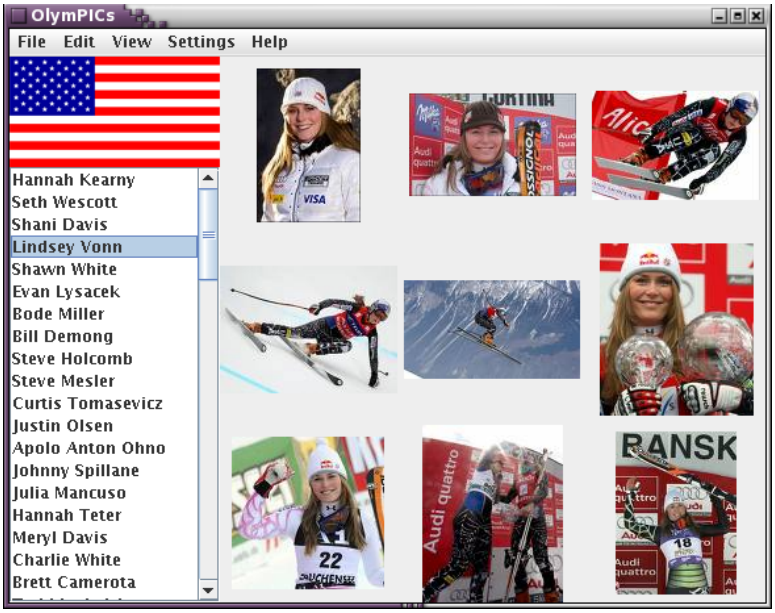
Open Notes You may consult any printed notes in your immediate possession during the course of this examination.

No Electronic Devices Permitted You may not use any electronic devices during the course of this examination, including but not limited to calculators, computers, and cellular phones. All electronic devices in the student's possession must be turned off and placed out of sight (for example, in the student's own pocket or backpack) for the duration of the examination.

Violations Copying another's work, or possession of electronic computing or communication devices in the testing area, is cheating and grounds for penalties in accordance with school policies.

Question 1: Graphical User Interfaces (25 points)

Roland wishes to create a GUI with the following view.



In this view, the flag should stay a constant size but the list of athletes should expand and contract vertically as the window is resized, and the nine images should move away from and towards each other both horizontally and vertically as the window is resized. Note that the images may be different dimensions but each is given the same amount of space in the layout.

A. **Explain** which components he could use to create this view.

B. **Explain** which layout manager(s) he could use to create this view.

Question 2: Binary I/O (20 points)

A. **Explain** one reason that saving a number such as 123 as binary is more efficient than storing it as text.

B. Given that you are to write software such that `employeeList` is an `ArrayList` of type `Employee` and each `Employee` has an `Address` and a `BenefitsPackage` and is a `Person` who has a `Name`, **explain** which of the classes just listed *you* would *need* to make serializable in order to use object I/O to load/save `employeeList`?

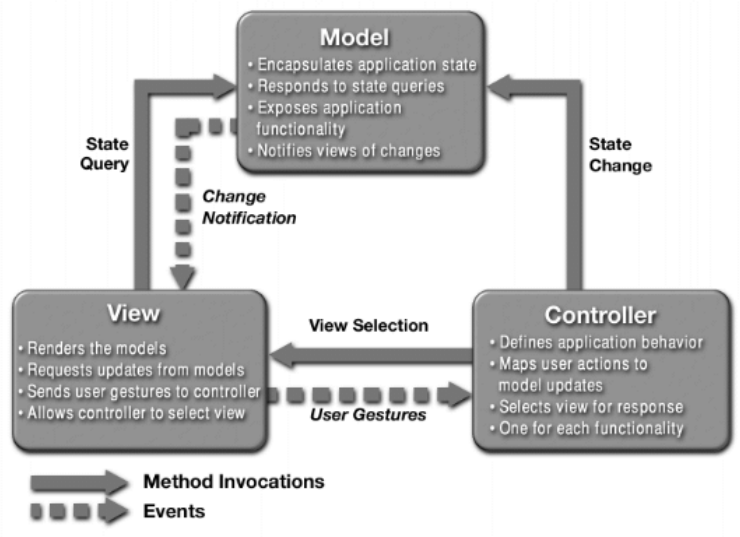
Question 3: Event-Driven Programming (10 points)

A. **Explain** what it means for a program to be "driven" by events.

B. **Explain** one alternative to having a program be event-driven. (That is, what else besides events could drive a program?)

Question 4: Model, View, Controller (25 points)

Assume that you are working with employee record-keeping software that has been developed using the Model, View, Controller (MVC) design pattern. List one example event or method invocation for each arrow shown in the diagram below. **Explain** why that event or method is necessary for this software to function correctly.



A. State Query.

B. State Change.

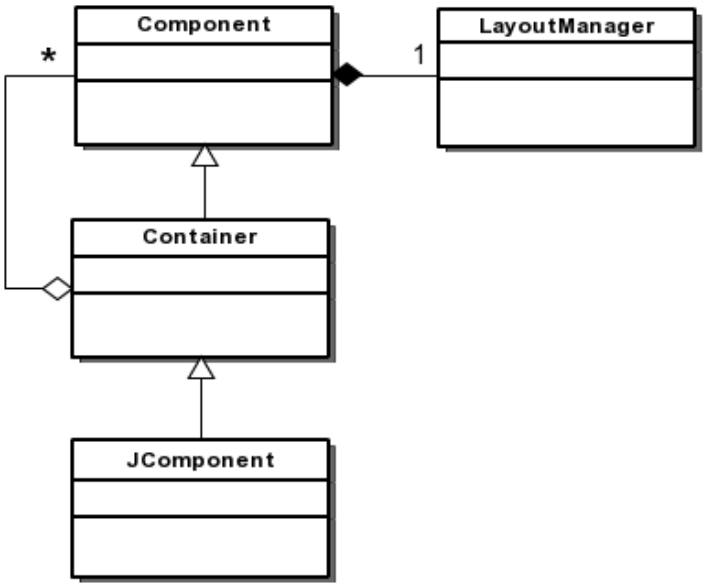
C. View Selection.

D. Change Notification.

E. User Gestures.

Question 5: OOP and GUI in Java (10 points)

Explain the following UML class diagram.



Question 6: Event-Driven Programming and MVC (10 points)

In our event-driven programs, we define listeners. This implies that someone or something is speaking (in some sense).

A. List and **explain** two examples of distinct kinds of speakers we have when we design our software using the Model, View, Controller design pattern.

B. List and **explain** the kinds of things each kind of speaker (from your answer to Part A) speaks about.