Student Name: _____ Student ID # _____

OU Academic Integrity Pledge
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.

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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.

Part I. Graphics, GUIs, and Event-Driven Programming

1. (2 points) For Swing components, the origin of the coordinate axis is where?
   A. upper left
   B. upper right
   C. lower right
   D. lower left
   E. center

2. (2 points) Which of the following is a component?
   A. `JFrame`
   B. `JPanel`
   C. `JButton`
   D. All of the above
   E. None of the above

3. (2 points) Which of the following is a container?
   A. `JFrame`
   B. `JPanel`
   C. `JButton`
   D. All of the above
   E. None of the above

4. (2 points) Which of the following can you draw on using `drawLine`?
   A. `JFrame`
   B. `JPanel`
   C. `JButton`
   D. All of the above
   E. None of the above

5. (2 points) Which if the following does not need to be placed inside a container?
   A. `JFrame`
   B. `JPanel`
   C. `JButton`
   D. All of the above
   E. None of the above

6. (2 points) Which method does an event source need?
   A. `createEvent`
   B. `processEvent`
   C. `notifyListener`
   D. `removeActionListener`
   E. `actionPerformed`

7. (2 points) Which method does a listener need?
   A. `createEvent`
   B. `processEvent`
   C. `notifyListener`
   D. `removeActionListener`
   E. `actionPerformed`

8. (2 points) How many `LayoutManager`s can a single `JPanel` use at any given time?
   A. None
   B. One
   C. One of each subclass of `LayoutManager`
   D. One for each component it contains
   E. Arbitrarily many

9. (2 points) Which is an example of composition in Java graphics?
   A. A container "has a" component
   B. A component "has a" container
   C. A container "is a" component
   D. A component "is a" container
   E. None of the above

10. (2 points) Which is an example of inheritance in Java graphics?
    A. A container "has a" component
    B. A component "has a" container
    C. A container "is a" component
    D. A component "is a" container
    E. None of the above

11. (3 points) `JComponent` should be which?
    A. Method
    B. Interface
    C. Abstract Class
    D. Concrete Class
    E. None of the above

12. (3 points) `JLabel` should be which?
    A. Method
    B. Interface
    C. Abstract Class
    D. Concrete Class
    E. None of the above

13. (3 points) What does it mean for a GUI component to be 'modal'?
    A. It holds key application data
    B. It is based on a similar GUI component
    C. At least one other GUI component is based on it
    D. It must be closed before focus is returned
    E. It has its own thread

14. (3 points) Which of the following is an example of polymorphism in Java graphics?
    A. `JPanel` is a subclass of `JComponent`
    B. You can override `paintComponent`
    C. A container "has a" `LayoutManager`
    D. Swing components are serializable
    E. A `JFrame` is a heavyweight component

15. (3 points) Which of the following is an example of inheritance in Java graphics?

A. `JPanel` ***is a subclass of*** `JComponent`
B. You can override `paintComponent`
C. A container "has a" `LayoutManager`
D. Swing components are serializable
E. A `JFrame` is a heavyweight component

16. (3 points) The fact that a container can contain a `JPanel`, a `JLabel`, or a `JButton` is an example of which?

A. Encapsulation
B. Inheritance
C. Multiple Inheritance
D. Subclass Assignment
E. Overloading

17. (3 points) Where in your code should you call `paintComponent`?

A. The constructor for your GUI
B. Inside `processEvent`
C. Inside `actionPerformed`
D. All of the above
E. None of the above

18. (3 points) Where in your code should you call `actionPerformed`?

A. The constructor for your GUI
B. Inside `processEvent`
C. Inside `actionPerformed`
D. All of the above
E. None of the above

19. (3 points) The first line of `paintComponent` is generally what?

A. `processEvent`
B. `actionPerformed`
C. `super.paintComponent`
D. `g.getGraphics`
E. None of the above

20. (3 points) Which method should be protected?

A. `processEvent`
B. `actionPerformed`
C. `paintComponent`
D. `getGraphics`
E. None of the above

Exam continues in Part II.

Part II. Model, View, Controller Design Pattern

For this exam, all questions refer to the particular version of MVC we have been studying.

21. (2 points) Which is a source of events?
    A. Model
    B. View
    C. Controller
    D. Model and View
    E. Model and Controller

22. (2 points) Which is a listener?
    A. Model
    B. View
    C. Controller
    D. Model and View
    E. Model and Controller

23. (2 points) What types of events are generated by the Model?
    A. Events about data changes
    B. Events about user interactions
    C. Events about control decisions
    D. All of the above
    E. None of the above

24. (2 points) What types of events are generated by the View?
    A. Events about data changes
    B. Events about user interactions
    C. Events about control decisions
    D. All of the above
    E. None of the above

25. (2 points) What types of events are generated by the Controller?
    A. Events about data changes
    B. Events about user interactions
    C. Events about control decisions
    D. All of the above
    E. None of the above

26. (2 points) What types of events are generated by the Driver?
    A. Events about data changes
    B. Events about user interactions
    C. Events about control decisions
    D. All of the above
    E. None of the above

27. (2 points) What types of events are listened for by the Model?
    A. Events about data changes
    B. Events about user interactions
    C. Events about control decisions
    D. All of the above
    E. None of the above

28. (2 points) What types of events are listened for by the View?
A. Events about data changes
B. Events about user interactions
C. Events about control decisions
D. All of the above
E. None of the above

29. (2 points) What types of events are listened for by the Controller?
A. Events about data changes
B. Events about user interactions
C. Events about control decisions
D. All of the above
E. None of the above

30. (2 points) What types of events are listened for by the Driver?
A. Events about data changes
B. Events about user interactions
C. Events about control decisions
D. All of the above
E. None of the above

31. (3 points) The Model contains references to which?
A. User
B. View
C. Controller
D. View and Controller
E. None of the above

32. (3 points) The View contains references to which?
A. User
B. Model
C. Controller
D. Model and Controller
E. None of the above

33. (3 points) The Controller contains references to which?
A. User
B. Model
C. View
D. Model and View
E. None of the above

34. (3 points) The Driver contains references to which?
A. Model and View
B. Model and Controller
C. View and Controller
D. Model, View, and Controller
E. None of the above

35. (3 points) Which principle is violated by having a view return a reference to one of its components?

A. Encapsulation
B. Polymorphism
C. Inheritance
D. Multiple Inheritance
E. None of the above

36. (3 points) In Swing, where are `ActionListener`s stored in the View?

A. In a class variable of the view class
B. In a instance variable of the view class
C. In a local variable inside `actionPerformed`
D. In the components of the view
E. None of the above

Exam continues in Part III.

Part III. Application of the Model, View, Controller Design Pattern

Sylvia has created a GUI-based system to keep track of her books. It has an interactive window that she can use to search on any data field or combination of fields (author, title, publisher, etc.) and it will display a scrolling list of all of the matching results.

37. (3 points) If Sylvia wants to add bar charts to display the data in a graphical form (such as how many books a particular author published each year), which will she need to modify?

A. Model
B. View
C. Model and View
D. View and Controller
E. Model, View, and Controller

38. (3 points) If Sylvia wants to add the ability to handle magazines as well as books, which will she need to modify?

A. Model
B. View
C. Model and Controller
D. View and Controller
E. Model, View, and Controller

39. (3 points) If Sylvia wants to store author name as a single `String` (rather than one `String` for each part of the author's name, which is how it is currently implemented), which will she need to modify?

A. Model
B. View
C. Model and Controller
D. View and Controller
E. Model, View, and Controller

40. (3 points) Currently, Sylvia's system uses only text files for saving and loading data on books. If Sylvia wants to allow the system to save and load data on books using object IO, which will she need to modify?

A. Model
B. View
C. Model and Controller
D. View and Controller
E. Model, View, and Controller