

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.

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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.

Question 1: Recursion (25 points)

Given the following code:

```
public class RecursionExample {
    private static int recursionExample (int value1, int value2){
        if (1 == value1) {
            System.out.println(value1 + ": " + value2);
            return value2;
        }
        else {
            value2 = value2 * recursionExample (value1 - 1, value2);
            System.out.println(value1 + ": " + value2);
            return value2;
        }
    }

    public static void main(String[] args) {
        recursionExample (3, 5);
    }
}
```

A. What will be printed when this program is run? *Explain* your answer.

B. In principle, should it be easy to convert this recursive code to iterative code that prints the same output given the same initial input? *Explain* your answer.

C. If you were to convert this code to use iteration instead of recursion, would you expect it to run faster, slower, or exactly the same speed as this recursive version? *Explain* your answer.

D. If you were to convert this code to use iteration instead of recursion, would you expect it to use more, fewer, or exactly the same number of local variables? *Explain* your answer.

Question 2: Preconditions, Assertions, Exceptions, and Object-Oriented Programming (15 points)

A. Given the code from Question 1, what would be a reasonable precondition to add to this function? *Explain* your answer.

B. Would it be better to encode this precondition as an assertion, a conditional with an exception, both, or neither? *Explain* your answer.

C. Where in the code would you place this precondition? *Explain* your answer.

Question 3: Recursion, Iteration, and Object-Oriented Programming (10 points)

A. Given the code from Question 1, does the `recursionExample` method need to be `static`? *Explain* your answer.

B. If you were to convert the `recursionExample` method to use iteration rather than recursion, would it need to be `static`? *Explain* your answer.

Question 4: Ethics (25 points)

Patricia is interested in politics, which she discusses on social media websites. Sometimes she finds herself debating friends of friends who have very different political views and some of these debates become quite heated. She is also a supporter of Clay Case, a candidate for State Senator.

One month ago, Patricia received an extremely nasty email regarding her online political conversations. The fact that she received the email at all was unsettling to her; she had tried to keep her personal email address private from everyone except her friends. However, what really bothered Patricia was that the email came from `cassandramootz@gmail.com`. Cassandra Mootz was the campaign coordinator for Bob Wazny—Clay Case’s political rival for State Senator! Angry, Patricia immediately fired off a scathing response, saying how horrible Wazny and Mootz were.

The nasty emails went back and forth for a while, until Patricia decided she’d had enough. At that point she sent an email saying “I’m done talking to you. Never email me again!” However, she continued to receive the nasty emails, even though she never replied to any more of them.

Finally, three days before the election, Patricia went public with the emails she received, which she considered harassment. She told the media about them and she posted them on social media sites. She made sure to edit out her own email address but she left in the sender’s. She didn’t want more harassing emails but she wanted everyone to know that these emails were coming from the Wazny campaign. Also, she didn’t post the nasty emails she sent—she wasn’t proud of those.

A. Find at least one ethical principle from a professional code of ethics that is relevant to this scenario. List the principle, give its source, and *explain* why you think it is relevant.

B. Say whether you think Patricia abided by (that is, followed) the principle you listed and *explain* how you came to that conclusion.

C. Give one likely motivation for Patricia's action and *explain* how you concluded that was a likely motivation.

D. List one ethical-decision-making problem that is likely to have contributed to at least one of Patricia's decisions and *explain* how you concluded that was a likely problem.

E. List one ethical-decision-making strategy that Patricia could employ to improve his ethical decision making and *explain* how she might employ that strategy in this situation.

Question 5: Model, View, Controller (25 points)

Vipin has developed a Java application for tracking personal finances following the MVC design pattern. It works great for entering, changing, saving, and loading data, and for displaying data in tables.

A. Vipin wants to add several graphing functions to his software, so that users can see where their money comes from and goes to in a more visual way. The graphs *will not* be interactive in the sense that the user cannot click on their contents, although each graph will be in its own window which can be closed independently. On the other hand, the graphs *will* be interactive in the sense that if the user changes the data or loads new data through the existing functions of the software, the graphs will update themselves.

To implement these changes, which part(s) (M, V, and/or C) of his software will Vipin need to change in order to add this functionality? *Explain* your answer.

B. Now Vipin wants to adapt his software from personal financial software to family financial software. The big change here is that his program will now allow for more than one person's finances to be processed and displayed at the same time, including in the tables and graphs.

To implement these changes, which part(s) (M, V, and/or C) of his software will Vipin need to change in order to add this functionality? *Explain* your answer.

Question 6: Applets (5 *bonus* points)

Which methods take the place of `main` in applets? *Explain* your answer.