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CS-405-R4888 Secure Coding

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**1-3 Activity: Numeric Overflow Coding**

**Summary of Process:**

1. **Understanding Problem**:
   * The initial code provided a set of template functions for adding and subtracting numbers.
   * The task was to detect, prevent, and notify about numeric overflow and underflow occurrences in these functions.
2. **Identifying Overflow and Underflow**:
   * The **add\_numbers()** function was prone to overflow when the result exceeded the maximum value.
   * The **subtract\_numbers()** function was prone to underflow when the result became negative.
3. **Implementing Overflow and Underflow**:
   * Added checks within the loop of **add\_numbers()** to detect overflow before performing addition.
   * Added checks within the loop of **subtract\_numbers()** to detect underflow before performing subtraction.
4. **Preventing Overflow and Underflow**:
   * When overflow was detected in **add\_numbers()**, returned the maximum value to prevent it.
   * When underflow was detected in **subtract\_numbers()**, returned the minimum value to prevent it.
5. **Notifying About Overflow and Underflow**:
   * Modified test functions (**test\_overflow()** and **test\_underflow()**) to output whether overflow or underflow was detected and the result accordingly.
6. **Handling Output**:
   * Utilized **std::ostringstream** to convert the result to a string for output when **std::to\_string** was not available.

**Challenges Faced:**

* The main challenge was handling overflow and underflow cases accurately across different data types while ensuring efficient prevention and detection.

**Solutions Implemented:**

* Implemented checks before addition and subtraction operations to detect overflow and underflow conditions.
* Prevented overflow by returning the maximum value and underflow by returning the minimum value.

**Conclusion:**

* Successfully implemented mechanisms to detect, prevent, and notify about numeric overflow and underflow in the provided C++ code.

**Screenshot of Console Output:**

**A screenshot of a computer program

Description automatically generated**

**A screenshot of a computer program

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**A screenshot of a computer program

Description automatically generated**

**A black screen with white text

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