CS240

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Testing Happens at Multiple Levels

- Unit Testing - Test individual classes in isolation.
- Integration Testing - Test the interaction between classes.
- System Testing - Test the entire system in context.

Different Perspectives

- Black-box testing
  - Develop tests on the basis of class specifications and documentation.
- White-box testing
  - Develop tests on the basis of implementation.
  - Aim for high code coverage.

Test-Driven Development

- Write tests first.
  - Helps clarify specifications.
  - Helps avoid mistakes in development.

Developing Test Cases

- To guarantee correctness, need to test every possible sequence of method calls, with every possible input value.

  - Usually not possible.
- Instead, look for boundary conditions
  - Test at the boundary, and on either side.
- Also test erroneous inputs
- Let's think about an example...

Regression Testing

- Testing is not a one-time process.
- Unit tests are maintained along with the code.
- This makes it easier to change the code:
    - All tests can be run after every change.

Unit Testing Frameworks

- To be useful, tests must be automated.
- JUnit, PyUnit, etc.
- Let's look at PyUnit...

Guidelines for Unit Tests

- Tests should:
    - be small.
    - be independent.
    - be fast.
    - not require interaction.
    - have informative names.
    - use the correct assertion type.
        - e.g. assertEquals(a,b) not assertTrue(a==b)