* Automated Testing Benefits
  + Automated Tests
    - free to run as often as desired
    - run at any time
    - quicker
    - less error prone
    - automated test code in source control
    - creation and maintenance cost
  + Manual Human Tests
    - cost every test ran (staff)
    - limited to staffed hours
    - slower
    - more error prone
    - manual testing scripts in external system
    - creation and maintenance cost
* costs are much greater to fix a defect once it's made it into production than it does at the coding/unit testing stage
* The Happiness Factor created by automated testing
  + happier end-users
    - accomplish more tasks/fewer problems
  + happier development team
    - less time fixing production defects
    - more time developing new features
    - increased confidence to make changes
    - increased system understanding
    - less unnecessary stress
  + happier business owners
    - reduced costs / increased revenues
    - improved business reputation / reliability
    - reduced staff turnover
* Icon

  Description automatically generated with medium confidenceUnit Tests
  + unit testing is testing a class or group of classes
  + Low level tests
  + highly focused tests
  + quick to execute (quick feedback speeds)
  + easy to test all parts / path of code
* Integration Tests
  + generally, if the code being tested uses external dependencies it would be considered an **integration test**
  + higher level than a unit test
  + Diagram

    Description automatically generatedthings working together
  + may be slow if external dependencies are involved
  + harder to test all parts / path of code
* Shape, circle

  Description automatically generatedSubcutaneous Tests
  + high level just below the surface of the UI
  + can test all the non-UI components working together
  + potentially quicker than automated UI tests
  + difficult to test UI
  + doesn’t test logic coded into the UI
* Functional UI Tests
  + testing as if we are the end-user
  + manipulating UI elements (e.g., clicking buttons, inputting text into text box)
  + Shape, circle

    Description automatically generated"Full stack" test
  + testing the functionality not the look and field
  + slow to execute
  + potentially brittle
* Test Breadth vs Depth
  + Depth: ability to get into the low-level details
  + A picture containing waterfall chart

    Description automatically generatedBreadth: ability of the type of testing to exercise a wide of the functionality of the application
* Logical Phases of an Automated Tests
  + Arrange Phase
    - getting things ready to test (created new instances of the things we want to test / set up external infrastructure or test data)
  + Act Phase
    - executing the functionality of the thing(s) we're testing to produce some response
  + Assert Phase
    - taking the response from the *act phase* and comparing it to an expected value
    - if the response value matches the expected value, then the test passes