Topics Covered:

- **Black box testing**
  - Equivalence Partitioning
  - Boundary value analysis
  - Decision table testing

Equivalence Partitioning

- Used to reduce the number of test cases.
- The system treats a range of values as same.
- All test Levels.
- Avoid fault masking.
- Input and output coverage
- Human input/output, Interfaces, Internal values, Time related.

Steps:

- Define the domain
- Identify the valid and invalid Partitions
- Select one test case for every partition.

Case study:

New tax will be applied depending on the income rate as follow:

From	To	%
0	1200	0
Over 1200	Up to 3000	5
Over 3000		10

Answer:

Input	**Expected output**
-1	System will not accept the value, error message will appear
750	System will accept the value, 0% will be applied
2500	System will accept the value, 5% will be applied
4000	System will accept the value, 10% will be applied

Invalid	valid (0%)		valid (5%)		valid (10%)
-1	0	1200	1201	3000	3001
-1	750		2500		4000

Boundary Value Analysis

- Boundaries are an area where developers commonly make mistakes.
- Ordered Partitions.
- All test Levels.
- 2-point boundary / 3-point boundary.
- Displacement / Omission.

Steps:

- Define the domain.
- Identify the valid and invalid Partitions.
- For 2-point boundary:
  - Select the values on bounds.
  - For the least bound choose a decrement
  - For the highest bound choose an increment
- For 3-point boundary.
  - Select the values on bounds.
  - For each bound choose a decrement and increment

Case study:

New tax will be applied depending on the income rate as follow:

From	To	%
0	1200	0
Over 1200	Up to 3000	5
Over 3000		10

- **Answer:**

Input	**Expected output**
-1	System will not accept the value, error message will appear
0 - 1200	System will accept the value, 0% will be applied
1201 - 3000	System will accept the value, 5% will be applied
3001	System will accept the value, 10% will be applied

Invalid	valid (0%)		valid (5%)		valid (10%)
	0	1200	1201	3000	3001
-1					→

Exercise

1. A candidate sits an exam with 40 questions. To pass, the candidate must answer at least 25 questions correctly. To gain a distinction, a mark of 32 or above must be achieved. Which of these groups of exam scores would fall into three different EP?

   A. 32, 36, 40

   B. 0, 27, 36

   C. 0, 24, 32

   D. 25, 32, 40

2. In a system designed to work out the tax to be paid:

An employee has 4,000 USD of salary tax free. The next 1,500 USD is taxed at 10% The next 28,000 USD is taxed at 22% Any further amount is taxed at 40% To the nearest whole pound.

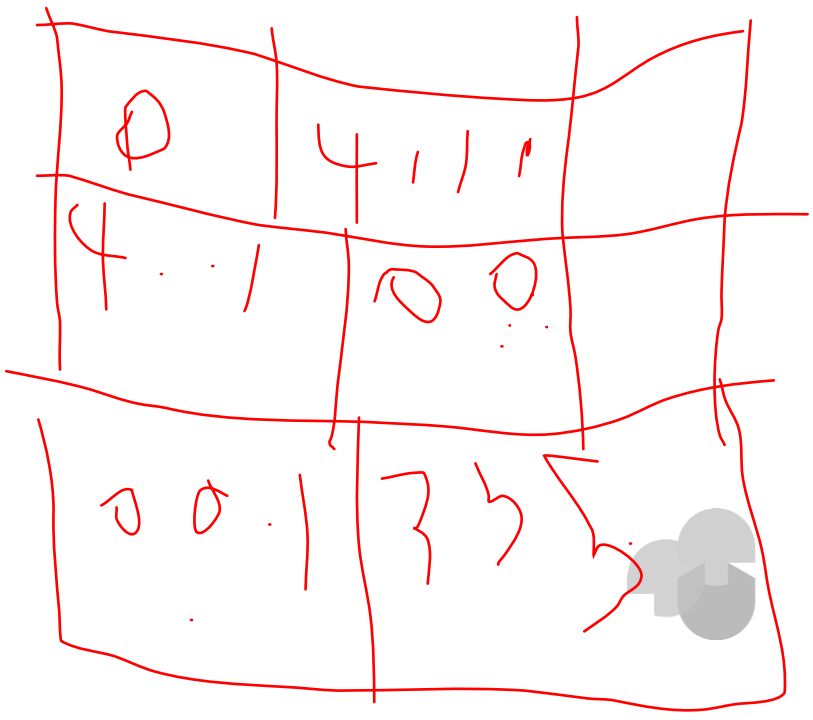
Which of these is a valid Boundary Value Analysis test case using two-point boundary?

A. 1,500

B. 32,001

C. 33,501

D. 28,000



3. In exercise 2: Which of these groups of numbers would fall into the same equivalence partition?

A. 4,800; 14,000; 28,000

B. 5,200 5,500; 28,000

C. 5,800; 28,000; 32,000

D. 28,001 32,000; 35,000

4. A speed control and reporting system has the following characteristics: If you drive 50 km/h or less, nothing will happen. If you drive faster than 50 km/h, but 55 km/h or less, you will be warned. If you drive faster than 55 km/h but not more than 60 km/h, you will be fined. If you drive faster than 60 km/h, your driving license will be suspended.

Which would be the most likely set of values (km/h) Identified by two-point boundary value analysis?

A. 0, 49, 50, 54, 59, 60

B. 50, 55, 60

C. 49, 50, 54, 55, 60, 62

D. 50, 51, 55, 56, 60, 61

5. Order numbers on a stock control system can range between 10,000 and 99,999 inclusive. Which of the following inputs might be a result of designing tests for only valid equivalence partition and valid boundaries?

A. 1,000-5,000-99,999

B. 10,000-99,999

C. 10,000-100,000

D. 9,999-10,000-50,000 99,999-100,000

6. A video application has the following requirement: The application shall allow playing a video on the following display sizes:

640x480/1280x720/1600x1200/1920x1080

Which of the following list of test cases is a result of applying the Equivalence Partitioning test technique to test this requirement?

A. Verify the application can play a video on a display of size 1920x1080 (1 test).

B. Verify the application can play a video on a display of size 640x480 and 1920x1080 (2 tests).

C. Verify the application can play a video on each of the display sizes in the requirement. (4 tests).

D. Verify the application can play a video on any one of the display sizes in the requirement (1 test).

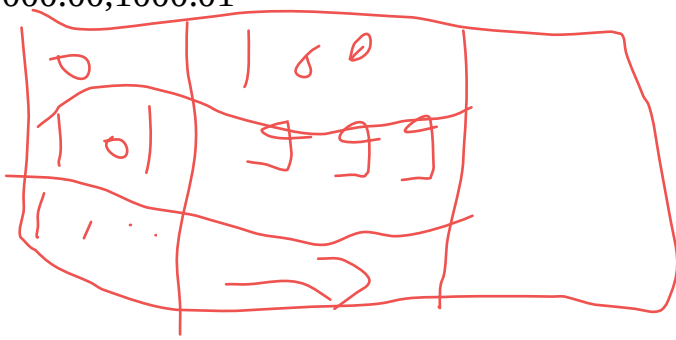
7. A banking system calculates interest rate for saving accounts as follows: 5% for amounts less than 100 USD, 8% for less than 1,000 USD, and 10% for 1,000 USD or more. Which test inputs in USD would be selected using two boundary analyses considering both valid and invalid boundary values?

A. 0.00, 0.01, 99.99, 100.00, 100.01, 999.99,1000.00,1000.01

B. -0.01, 0.00, 99.99, 100.00, 999.99, 1000.00

C. -0.01, 99.99, 100.00, 999.99, 1000.00

D. 0.00, 100.00, 100.01, 1000.00, 1000.01



Decision Table Testing

- Logical requirements combination.
- Finding problems and ambiguities in the specification.
- Used to test the complex business rules.
- All test Levels.
- Identify the conditions and actions.

Steps:

- Identify the conditions.
- Identify the actions.
- Calculate the number of test cases by 2^n formula.
- Element the not applicable test cases.
- Select the appropriate actions based on the requirements.
- Marge test cases with same expected results in case you don't care with combinations.

Exercise

1. The driving license system allow the user to get the driving license under certain conditions:
   - If the applicant age is 18 or higher and he pass the driving exam and the medical checkup results is good.

But if the applicant fails in the driving exam, he can apply again after 3 months.

If the applicant medical checkup results not well, s/he can apply again after 6 months.

2. New tax will be applied depending on the following Conditions:
   Income less than 1,200 and not married and younger than 35, tax = 15% Income less than 1,200 and married and younger than 35, tax = 10% Income less than 1,200 and married and older than 35, tax = 5%
   Else 20%