Equivalence Partitioning

1. Function that validates credit card numbers.

- Valid card numbers: Length between 13 and 16 digits, containing only numeric digits.

Test Case	Input	Expected Result
1	1234567890123	Valid
2	1234567890123456	Valid
3	123456789012	Invalid
4	12345678901234567	Invalid
5	123456789012a	Invalid
6	123456789012_	Invalid

2. Function that validates dates.

- Valid years: Between 1900 and 2100.
- Valid months: Between 1 and 12.
- Valid days: Between 1 and 31.

Test Case	Inputs	Expected Result
1	1/1/1900	Valid
2	12/31/2100	Valid
3	1/1/1899	Invalid
4	12/31/2101	Invalid
5	13/1/1900	Invalid
6	0/1/1900	Invalid
7	1/32/1900	Invalid
8	1/0/1900	Invalid
9	a/1/1900	Invalid
10	1/a/1900	Invalid
11	1/1/19aa	Invalid

3. Function that checks the eligibility of a passenger to book a flight.

- Eligible ages: Between 18 and 65.
- Frequent flyers: True or False.

Test Case	Inputs	Expected Result
1	17, True	Invalid
2	17, False	Invalid
3	18, True	Valid
4	18, False	Valid
5	65, True	Valid
6	65, False	Valid
7	66, True	Invalid
8	66, False	Invalid

4. Function that validates URLs.

- Valid URLs: Length less than or equal to 255, starting with "http://" or "https://".

Test Case	Input	Expected Result
1	htt://aaa	Invalid
2	http://aaa	Valid
3	https://aaa	Valid
4	http://123456789012345678901234567890123456789012 34567890123456789012345678901234567890123456789 01234567890123456789012345678901234567890123456 78901234567890123456789012345678901234567890123 45678901234567890123456789012345678901234567890 1234567890123456789	Invalid
5	https://12345678901234567890123456789012345678901 23456789012345678901234567890123456789012345678 90123456789012345678901234567890123456789012345 67890123456789012345678901234567890123456789012 34567890123456789012345678901234567890123456789 0123456789012345678	Invalid

Boundary Value Analysis

1. Function that calculates the eligibility of a person for a loan based on their income and credit score.

The eligibility rules are as follows:

- If the income is less than $30,000, the person is not eligible for a loan.
- If the income is between $30,000 and $60,000 (inclusive) and the credit score is above 700, the person is eligible for a standard loan.
- If the income is between $30,000 and $60,000 (inclusive) and the credit score is below or equal to 700, the person is eligible for a secured loan.
- If the income is greater than $60,000 and the credit score is above 750, the person is eligible for a premium loan.
- If the income is greater than $60,000 and the credit score is between 700 and 750 (inclusive), the person is eligible for a standard loan.

Test Case	Inputs		Expected Output
	Income	Credit Score	
1	29,999.99	699	Not Eligible for a Loan
2	29,999.99	700	Not Eligible for a Loan
3	29,999.99	750	Not Eligible for a Loan
4	30,000	700	Eligible for a Secured Loan
5	60,000	700	Eligible for a Secured Loan
6	30,000	701	Eligible for a Standard Loan
7	60,000	701	Eligible for a Standard Loan
8	30,000	750	Eligible for a Standard Loan
9	60,000	750	Eligible for a Standard Loan

10	60,000.01	751	Eligible for a Premium Loan
11	60,000.01	700	Eligible for a Standard Loan
12	60,000.01	750	Eligible for a Standard Loan

2. Function that determines the category of a product in an e-commerce system based on its price.

The product categories and pricing rules are as follows:

- Category A: Products priced between $10 and $50 (inclusive).
- Category B: Products priced between $51 and $100 (inclusive).
- Category C: Products priced between $101 and $200 (inclusive).
- Category D: Products priced above $200.

Test Case	Input	Expected Output
1	10	“Category A”
2	50	“Category A”
3	51	“Category B”
4	100	“Category B”
5	101	“Category C”
6	200	“Category C”
7	201	“Category D”
8	9	Invalid input or error.

3. Function that calculates the cost of shipping for packages based on their weight and dimensions.

The shipping cost rules are as follows:

- If the weight of the package is less than or equal to 1 kg and the dimensions (length, width, and height) are each less than or equal to 10 cm, the cost is $5.
- If the weight is between 1 and 5 kg (inclusive) and the dimensions are between 11 and 30 cm (inclusive), the cost is $10.

- If the weight is greater than 5 kg or any of the dimensions is greater than 30 cm, the cost is $20.

Test Cases	Inputs				Expected Output
	Weight	Length	Height	Width	
1	1	10	10	10	5
2	1.1	10	10	10	Invalid inputs or error
3	1.1	11	11	11	10
4	5	30	30	30	10
5	5.1	10	10	10	20
6	2	31	10	10	20
7	0.9	10	10	10	Invalid inputs or error

Decision Table

1. Create the decision table for a system that provides weather advisories based on temperature and humidity.

The rules are:

- Weather recommendation "High temperature and humidity. Stay hydrated." for temperature > 30 and humidity > 70.
- Weather recommendation "Low temperature. Don't forget your jacket!" for temperature < 0 and any humidity.
- No weather recommendation for any other temperature and humidity combination.

Test Case	Conditions		Expected Action or Output
	Temperature	Humidity	
1	> 30	> 70	"High temperature and humidity. Stay hydrated."
2	> 30	<= 70	No recommendation.
3	< 0	Any	"Low temperature. Don't forget your jacket!"
4	0 <= T <= 30	Any	No recommendation

2. Create the decision table for a system that authenticates users based on their username and password.

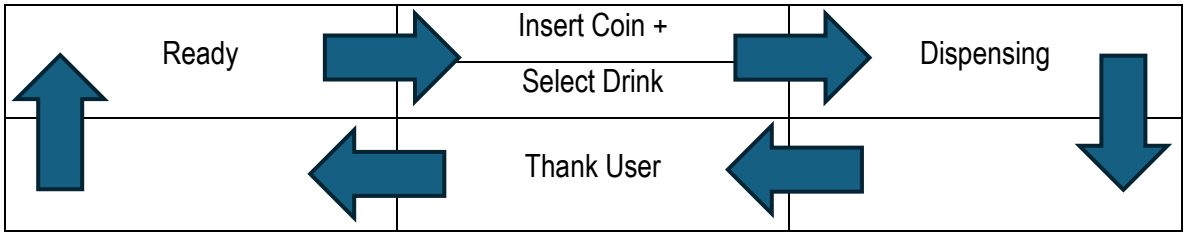
The rules are:

- Returns "Admin" for username "admin" and password "admin123".
- Returns "User" for any other username with at least 5 characters and password with at least 8 characters.
- Returns "Invalid" if the username or password lenghts are not met.

Test Case	Conditions		Authentication
	Username	Password	
1	“admin”	“admin123”	“Admin”
2	“user1”	“pass1234”	“User”
3	“user2”	“pass5678”	“User”
4	“user”	“pass1234”	“Invalid”
5	“user3”	“pas123”	“Invalid

State Transition

1. Draw the state transition diagram for a simple vending machine that dispenses drinks.
   - It has two states: "Ready" and "Dispensing".
   - Goes from Ready to Dispensing when inserting a coin and asks you to select the drink.
   - After selecting the drink, thanks you and goes from Dispensing to Ready.



2. Draw the state transition diagram for an elevator system.

- The states are "Idle", "Moving Up" and "Moving Down".
- The elevator can only move up or down if the state is in "Idle" state.
- The elevator can only stop if the state is either "Moving Down" or "Moving Up"