# Project Name:

Phone Unlock Using Pattern Predictor

# Members:

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# Procedure:

This Python program generates a random, valid phone unlock pattern just like the one you use on an Android 3×3 lock screen.
It follows the same rules your phone uses — you can't skip over a dot unless you've already touched it, and you can't revisit a dot that's already part of the pattern.

### Step-by-Step explanation:

**Importing Libraries**
**NumPy**: Helps store and handle the (x, y) positions of each dot on the screen.
**Matplotlib**: Used to draw the grid and visually connect the dots.
**Random**: Chooses random valid moves to form the pattern.

**Defining Jump Rules (jumps dictionary)**
Some moves require an "in-between" dot to be used first.
For example, moving from 0 to 2 directly requires dot 1 to be already part of the pattern.

**Checking Valid Moves (is_valid_move)**
Makes sure the next dot:
Hasn't been used before.
Doesn't break the jump rules.

**Generating a Pattern (generate_random_pattern)**
Starts from a random dot.
Adds valid next moves until the desired pattern length is reached or no moves are possible.

**Drawing the Pattern (draw_pattern)**
Place dots in a 3×3 grid.
Colors the dots light gray, numbers them, and draws red lines between them in the order they're touched.
The starting dot is highlighted in green.

**Execution**
A pattern of length 5 is created.
The program prints the sequence of dots and displays the pattern visually.

# How It Is Used:

This tool can be applied in:

**Security research** – Simulating and testing different unlock patterns.
**UI design** – Building gesture-based authentication systems.
**Data generation** – Creating datasets for AI models that learn and predict patterns.

It ensures that every pattern follows the same restrictions as an actual Android lock screen.

# Conclusion:

This code successfully produces and displays realistic, valid unlock patterns for a 3×3 Android grid.
By respecting Android's rules, it becomes a useful resource for education, security research, and user interface development.
It can even be extended into a pattern prediction model for deeper security analysis.