Algorithm

I. Initial state: Set X0
II. State transition:
    - Repeat for each time step:
        - Update state: Xn+1 = f(Xn)

Pseudocode:

```python
def step(X_n):
    X_n+1 = f(X_n)
```

### Analysis

- **Time Complexity**: $O(n)$
- **Space Complexity**: $O(1)$

**Recurrence Relations**

- $T(n) = T(n-1) + T(n-2)$
- Divide and conquer approach

### Example

- Initial state: $X_0 = 0$
- Recurrence relation: $T(n) = 0$ for $n < 2$
- $T(2) = 1$
- $T(n) = T(n-1) + T(n-2)$ for $n > 2$

**General Solution**

- $T(n) = \Theta(2^n)$

**Example Calculation**

- $T(1) = 1$
- $T(2) = 1 + 1 = 2$
- $T(3) = 2 + 1 = 3$
- $T(4) = 3 + 2 = 5$
- $T(5) = 5 + 3 = 8$
- $T(n) = 2^n$ for large $n$