CS 130 Homework 5

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The following problems are taken from exercises at the end of Section 2.4 of Gersting, 6e.

1 (Exercise 9) Write the first five values in the sequence.

$$\begin{aligned} W(1) &= 2 \\ W(2) &= 3 \\ W(n) &= W(n-1)W(n-2) \qquad (\text{for } n > 2) \end{aligned}$$

2 (Exercise 14) Prove the property of Fibonacci numbers directly from the definition.

$$F(n+3) = 2F(n+1) + F(n) \quad \text{for } n \geq 2$$

3 (Exercise 17) Prove the property of the Fibonacci numbers for all $n \geq 1$ using weak induction.

$$F(2) + F(4) + \cdots + F(2n) = F(2n+1) - 1$$

4 (Exercise 21) Prove the property of the Fibonacci numbers for all $n \geq 1$ using strong induction.

$$F(n+6) = 4F(n+3) + F(n) \quad \text{for } n \geq 1$$

5 (Exercise 58) Write a recursive definition for the given sequence S.

$$S = 1, 3, 9, 27, 81, \ldots$$

6 (Exercise 72) The binary search algorithm is used with the following list; x has the value "Chicago". Name the elements against which x is compared.

Boston, Charlotte, Indianapolis, New Orleans, Philadelphia, San Antonio, Yakima