CS 30: Recursive Functions Practice

Find the generalized pattern for each of the following:

1.

n	$f(n)$
1	1
2	4
3	8
4	13
5	19
6	26

$f(1) = 1$
$f(2) = 4 = 1 + 3 = 1 + (2 + 1)$
$f(3) = 8 = 4 + 4 = 4 + (3 + 1)$
$f(4) = 13 = 8 + 5 = 8 + (4 + 1)$
$f(5) = 19 = 13 + 6 = 13 + (5 + 1)$
$f(6) = 26 = 19 + 7 = 19 + (6 + 1)$

$f(n) = f(n - 1) + (n + 1)\ when\ n \geq 2$

2.

n	$f(n)$
1	5
2	7
3	9
4	11
5	13
6	15

$f(1) = 5 = 5 + 0$
$f(2) = 7 = 5 + 2$
$f(3) = 9 = 7 + 2$
$f(4) = 11 = 9 + 2$
$f(5) = 13 = 11 + 2$
$f(6) = 15 = 13 + 2$

$f(n) = 5 + 2(n - 1) = 5 + 2n - 2 = 2n + 3$

For more information: https://youtu.be/_cooC3yG_p0

3.

n	$f(n)$
1	2
2	4
3	8
4	16
5	32
6	64

$f(1) = 2 = 2^1$
$f(2) = 4 = 2^2$
$f(3) = 8 = 2^3$

$f(n) = 2^n$

4.

n	$f(n)$	$f(1) = 1$ $f(2) = 2 = 2 \cdot 1$ $f(3) = 6 = 3 \cdot 2$ $f(4) = 24 = 6 \cdot 4$ $f(5) = 120 = 24 \cdot 5$ $f(6) = 720 = 120 \cdot 6$ $f(n) = f(n-1) \cdot n \, when \, n \geq 2$
1	1	
2	2	
3	6	
4	24	
5	120	
6	720	

5.

n	$f(n)$	$f(1) = 2$ $f(2) = 3$ $f(3) = 6 = 2 \cdot 3$ $f(4) = 18 = 3 \cdot 6$ $f(5) = 108 = 6 \cdot 18$ $f(6) = 1944 = 18 \cdot 108$ $f(n) = f(n-1) \cdot f(n-2) \, when \, n > 2$
1	2	
2	3	
3	6	
4	18	
5	108	
6	1944	