Recursion Exercises

1. You did such a terrific job organizing last year’s parade that you’ve been asked to do it again. This year’s parade will consist of bands, floats, and a new type of entry—equestrian groups. We have some additional restrictions to consider:
   - No band can follow another band (same as before)
   - No band can follow an equestrian group (it might spook the horses), and
   - No equestrian group can follow another equestrian group (horses might not all get along with each other)

How many ways can you organize a parade of length n?

Use P(n), F(n), B(n), and E(n) in a similar manner as the example given in the book. So,

\[ P(n) = F(n) + B(n) + E(n) \]

Solve in terms of P(n) and determine the base cases.
This is exercise 3.18 in the text, p. 167:

This problem considers several ways to compute $x^n$ for some $n \geq 0$.

- Write an iterative method `power1` to compute $x^n$ for $n \geq 0$.

- Write a recursive method `power2` to compute $x^n$ by using the following recursive formulation:
  
  $x^0 = 1$
  
  $x^n = x \cdot x^{(n-1)}$ if $n > 0$

- Write a recursive method `power3` to compute $x^n$ by using the following recursive formulation:
  
  $x^0 = 1$
  
  $x^n = \left(x^{\frac{n}{2}}\right)^2$ if $n > 0$ and $n$ is even
  
  $x^n = x \cdot \left(x^{\frac{n}{2}}\right)^2$ if $n > 0$ and $n$ is odd