1. Find a power series representation for $f(x) = \frac{2}{3-x}$ centered at $a = 0$.

   Solution Recall the formula

   $$\frac{1}{1-x} = \sum_{n=0}^{\infty} x^n, \qquad \text{for } |x| < 1.$$

   We have

   $$\frac{2}{3-x} = \frac{2}{3\left(1 - \frac{x}{3}\right)} = \frac{2}{3}\frac{1}{1 - \frac{x}{3}}$$

   $$= \frac{2}{3}\sum_{n=0}^{\infty} \left(\frac{x}{3}\right)^n = \sum_{n=0}^{\infty} \frac{2x^n}{3^{n+1}}$$

   for $\left|\frac{x}{3}\right| < 1$.