

Quiz 9 – Math 2153, Calculus II – Nov. 11, 2011

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

Solution Recall the formula

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

We have

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

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