

**Math 9C Homework 9**  
Commonly Asked Questions

1. Solution to the in-class problem: Find a power series representation for the function

$$f(x) = \frac{x}{2x^2 + 1}.$$

We can rewrite this function to look like the sum of a geometric series:

$$\frac{x}{1 - (-2x^2)}.$$

Thus, we have  $a = x$  and  $r = -2x^2$ , so the power series representation is

$$\sum_{n=0}^{\infty} x(-2x^2)^n = \sum_{n=0}^{\infty} (-2)^n x^{2n+1}.$$

Since a geometric series converges for  $r < 1$ , here we get that this series converges for  $|-2x^2| < 1$ , so when  $|x| < \sqrt{2}$ . Thus, the interval of convergence is  $(-\sqrt{2}, \sqrt{2})$ .