

Quiz 4

Name: _____

1. Given that

$$\frac{1}{1-x} = 1 + x + x^2 + x^3 + x^4 \dots \quad \text{when } |x| < 1$$

and

$$\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \frac{x^9}{9!} - \dots$$

find the power series representation for each of the following functions

(a) $f(x) = \frac{x}{2+x^2}, \quad |x| < 1$

(b) $g(x) = \int_0^x \frac{\sin t}{t} dt$

2. Find the Maclaurin polynomial (i.e., Taylor polynomial centered at 0) of order 4 for

$$l(v) = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}}$$

Explain why this is almost 1 when v , compared to c , is very small.

3. True or False: Justify your answer with appropriate reasoning.

Any function has a Taylor series expansion around any given point.