

1. Today we're going to work with $f(x) = \sin(x)$ and its MacLaurin Series.
 - (a) Write out the MacLaurin Series for $f(x) = \sin(x)$, aka the Taylor Series at $x = 0$. Write your answer as a single sum. (You can find this on the handout of known series.)
 - (b) As a warmup use your series to approximate $\sin(1)$ to two decimal place accuracy.

(c) Write down the first five non-zero terms of your series.

(d) Take the derivative of this sum ‘term by term’ and simplify.

(e) What do you notice? Why is this not surprising?

2. From geometric series ($\frac{a}{1-r}$) we know that $\sum_{k=0}^{\infty} x^k = \frac{1}{1-x}$.

(a) Use this to find the series for $\frac{1}{1-4x}$.

(b) Use this to find the series for $\frac{1}{1+x^2}$.