Math 146 - Calculus II Name_____

MacLaurin Series

A MacLaurin Series is an infinite Taylor polynomial, centered at $x = 0$.

1. Consider the function $f(x) = \cos(x)$.

   (a) Find $p_4(x)$, the degree 4 Taylor polynomial for f at $x = 0$.

   $f(x) = \cos(x)$ $\qquad$ $f(0) =$

   $f'(x) =$ $\qquad$ $f'(0) =$

   $f''(x) =$ $\qquad$ $f''(0) =$

   $f^{(3)}(x) =$ $\qquad$ $f^{(3)}(0) =$

   $f^{(4)}(x) =$ $\qquad$ $f^{(4)}(0) =$

   (b) Without further calculations, make a prediction for the formula for $p_6(x)$.

   (c) Check your answer by creating a graph on Desmos which includes f, p_4 and p_6. Sketch that graph here, labelling each end of each function.

(d) Estimate $\cos(-1)$ using p_4 and p_6. What is the value of $\cos(-1)$ to 6 decimal places?

(e) The Taylor Series for f is the infinite Taylor polynomial. Write the Taylor Series for $f(x) = \cos(x)$ (with a $+\ldots$), and then express your answer as a single infinite sum (using a Σ).