Math 146 - Calculus II Name_____

Taylor Series

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

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

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

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

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

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

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

   (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) The Taylor Series for f is the infinite Taylor polynomial. Write the Taylor Series for $f(x) = \cos(x)$ as a single infinite sum.

2. Consider the function $g(x) = \ln(x)$.

   (a) Explain why we can't find a Taylor polynomial for g at $x = 0$.

   (b) Find $p_3(x)$ for $g(x)$ at $x = 1$.

   (c) Make a prediction for $p_5(x)$. If you have time, make a graph to verify your results.