

Let  $f(x) = \sin(x)$  and

let  $P_k(x)$  be the  $k$ th order Taylor polynomial for  $f(x)$  at  $x_0 = 0$ .

1. Find  $P_1(x)$ ,  $P_3(x)$ , and  $P_5(x)$ .
2. Verify your answer by graphing the polynomials and  $f(x)$  on the same set of axes.
3. Use  $P_5(x)$  to find an approximation for  $\sin(2)$ .  
Will this be larger or smaller than the actual value of  $\sin(2)$ ?
4. Now find  $P_{19}(x)$ .  
*Hint:* You don't actually need to take all of the derivatives.