

Taylor Polynomials I

Demonstration Activity

- 1) Open the Taylor Polynomials I Demonstration located at <http://demonstrations.wolfram.com/TaylorSeries/>
- 2) First get familiar with the various options. Choose a function. Adjust the slider for the approximation order. Click on graphs or difference. You can also reposition the center point of the Taylor Series by moving the circle on the graph.
- 3) Let $f(x) = \sin x$. How come when you move the approximation order from 1 to 2, or from 3 to 4, or from 5 to 6, the graph doesn't change?
- 4) Calculate the 10th order Taylor Polynomial $TP_{10}(x)$ for $f(x) = \sin x$ by hand. Show all work.
- 5) What approximation order would you need to use to get a good approximation for $\sin(2)$ using a Taylor Polynomial? Explain why?
- 6) What approximation order would you need to use to get a good approximation for $\sin(4)$ using a Taylor Polynomial? Explain why?
- 7) Use the 4th order Taylor Polynomial $TP_4(4)$ to approximate $\sin(4)$. How close is it to the

exact value of $\sin(4)$?

8) Instead of centering the Taylor Polynomial at zero, move the center point (the circle) to approximately 3. What order approximation would you need to use to approximate $\sin(4)$ now?

9) Find the 4th order Taylor Polynomial $TP_4(x)$ for $\sin x$ centered at π **by hand**.

10) Find $TP_4(4)$

11) Find the exact value of $\sin(4)$ and compare to $TP_4(4)$.