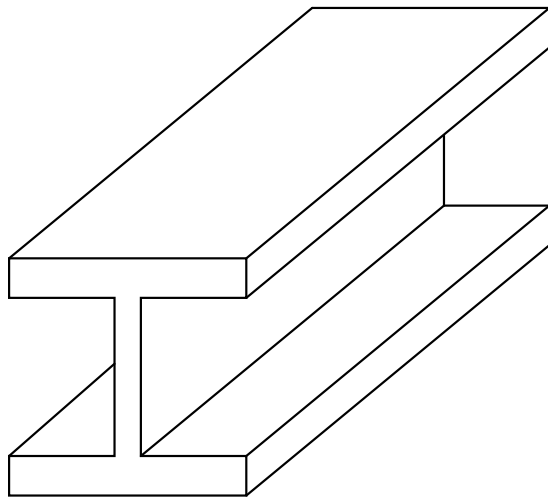


CEE384

# Taylor Series

*Approximating Functions with Polynomials*



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Updated: December 7, 2018

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## 1 Motivation

There are many functions that are just a bit annoying. Instead of dealing with the actual function we want to deal with a much simpler polynomial approximation of that function. For instance, the familiar trigonometric functions have known values at discrete points but calculating the cosine of a value not at a particular point is not directly possible without a numerical approximation.

We will begin by looking at the sin function. Essentially we want to make the function sin equal to some polynomial

$$\sin(x) = a_0 + a_1x + a_2x^2 + a_3x^3 \quad (1)$$

We have two problems. 1) we don't currently have a value for  $x$  and 2) We don't have enough equations to determine the coefficients in the Taylor polynomial.

Problem one is pretty easy to solve. We just need to pick a point,  $x$ , to center our approximation about. This should be a convenient point that we know the value of the function at.  $x = 0$  will do for this example.

The second problem can be solved by generating more equations.

## References