TAYLOR POLYNOMIAL APPROXIMATIONS

**Def:** Suppose a function $f$ has $n$ derivatives at $x_0$. Then the **Taylor polynomial of degree $n$** centered at $x_0$ which approximates $f$ is . . .

**Recall:**

**Note:**

**Ex 1: (A Classic.)** Find the Taylor polynomial of degrees 0, 1, 2, and 3 centered at 0 for $f(x) = e^x$. 
Ex 2: Solve the IVP \( y'' - 2y' - t^{3/2}y = 0, \quad y(0) = 5, \quad y'(0) = 10. \)
Def: The **Taylor series** for a function $f$ centered at $x_0$ is . . .

Note:

**Review of Power Series:**
Def: A **power series** centered at $x_0$ is of the form . . .

Def: We say a power series centered at $x_0$ **converges** at $x = c$ if . . .

Def: We say a power series centered at $x_0$ **converges absolutely** at $x = c$ if . . .

Recall:

**Thm:** For a power series centered at $x_0$, exactly one of the following hold:

1.

2.

3.