

WORKSHEET # 3

Taylor Series

(1) Consider the initial value problem $\begin{cases} y' = xy^3 - 9x \\ y(1) = 2 \end{cases}$

(a) Compute $y'(1)$. Is the solution to the IVP *increasing* or *decreasing* near $x = 1$?

$y'(1) =$ Solution is near $x = 1$

(b) Compute $y''(1)$. Is the solution to the IVP *concave up* or *concave down* near $x = 1$?

$y''(1) =$ Solution is near $x = 1$

(2) Find the first three nonzero terms of the Maclaurin Series of the solution of the initial value problem $y' = xy, \quad y(0) = 1$.

(3) Find the first four nonzero terms of the Maclaurin Series of the solution of the initial value

$$\text{problem } \begin{cases} y'' - 2y' + y = 0 \\ y(0) = 0 \\ y'(0) = 1 \end{cases}$$

(4) (a) Find the first four terms of the Taylor Series about $x_0 = 1$ of the solution of the initial value problem $y' - 2y = e^{2x}$, $y(1) = 0$.

(b) Plot the graphs of the polynomial obtained in (a) and the actual solution $y = e^{2x}(x - 1)$ over the interval $[0.0, 1.7]$. Attach both graphs to this worksheet.