8. Assignment 8
Due Wednesday, March 30

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(1) Determine the order and the region of absolute stability of s-step Adams-Bashforth methods for \( s = 2, 3 \),

\[
s = 2: \quad y_{n+2} = y_{n+1} + h \left[ \frac{3}{2} f(t_{n+1}, y_{n+1}) - \frac{1}{2} f(t_n, y_n) \right]
\]

\[
s = 3: \quad y_{n+3} = y_{n+2} + h \left[ \frac{23}{12} f(t_{n+2}, y_{n+2}) - \frac{4}{3} f(t_{n+1}, y_{n+1}) + \frac{5}{12} f(t_n, y_n) \right]
\]

and the order and the region of absolute stability of the 2-step Adams-Moulton method,

\[
s = 2: \quad y_{n+2} = y_{n+1} + h \left[ \frac{5}{12} f(t_{n+2}, y_{n+2}) + \frac{2}{3} f(t_{n+1}, y_{n+1}) - \frac{1}{12} f(t_n, y_n) \right]
\]

(2) Determine the order and the region of absolute stability of Backward Differentiation Formulas (BDF) methods of orders \( s = 2, 3 \):

\[
s = 2: \quad y_{n+2} - \frac{4}{3} y_{n+1} + \frac{1}{3} y_n = \frac{2}{3} h f(x_{n+2}, y_{n+2})
\]

\[
s = 3: \quad y_{n+3} - \frac{18}{11} y_{n+2} + \frac{9}{11} y_{n+1} - \frac{2}{11} y_n = \frac{6}{11} h f(x_{n+3}, y_{n+3})
\]

In all problems describe (briefly) your approach and plot the regions.