1. Consider the differential equation

\[ \frac{dy}{dt} = 2y(1-y); \quad y(0) = 0.25. \]

(a) Solve the differential equation above.

(b) Take 10 time steps of forward Euler with \( \Delta t = 1 \) and plot the approximate solution as a function of time. Is this a reasonable approximate solution? Explain.

(c) Take 5 time steps of forward Euler with \( \Delta t = 1/5 \) to compute the approximate solution at \( t = 1 \), and compute the error in the approximation.

(d) Repeat part (b) by taking 10 time steps with \( \Delta t = 1/10 \), and comment on how the error of the approximation decreased.