Population Growth Problem.

In[284]:=

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t0 = 0.0; (*initial time time*)
dt = 0.001; (*time step*)
tf = 10.0; (*final time*)
n0 = 1000.0; (*initial value for n = number of Population*)
a = 10.0; (*characteristic time*)
b = 0;
tl = Range[t0, tf, dt]; (*time list*)
lt = Length[tl];
nl = 0 * tl; (*intialize the list of numbers of Population*)
nl[[1]] = n0; (* initialization of the first *)
Do [nl[[i + 1]] = nl[[i]] * (1 + (a * dt) - (b * dt * nl[[i]])), {i, 1, lt - 1}];
nt[t_, a_, n0_] = n0 Exp[a * t]; (*Exact solution*)
fig1 = Plot[nt[t, a, n0], {t, t0, tf}, PlotRange → All , PlotStyle → Red];
(*graph of exact solution*)
tn = Table[{tl[[i]], nl[[i]]}, {i, lt}];
fig2 = ListPlot[tn , PlotRange → All];(*graph of numerical solution*)
Show[{fig1, fig2}, Frame → True, FrameLabel → {"t", "n(t)"}, LabelStyle → 13]
Clear[b]
b = 0.001;
Do [nl[[i + 1]] = nl[[i]] * (1 + (a * dt) - (b * dt * nl[[i]])), {i, 1, lt - 1}];
nt[t_, a_, n0_] = a / (b + (a / n0 - b) * Exp[-a * t]); (*Exact solution*)
fig1 = Plot[nt[t, a, n0], {t, t0, tf}, PlotRange → All , PlotStyle → Red];
(*graph of exact solution*)
tn = Table[{tl[[i]], nl[[i]]}, {i, lt}];
fig2 = ListPlot[tn , PlotRange → All];(*graph of numerical solution*)
Show[{fig1, fig2}, Frame → True, FrameLabel → {"t", "n(t)"}, LabelStyle → 13]
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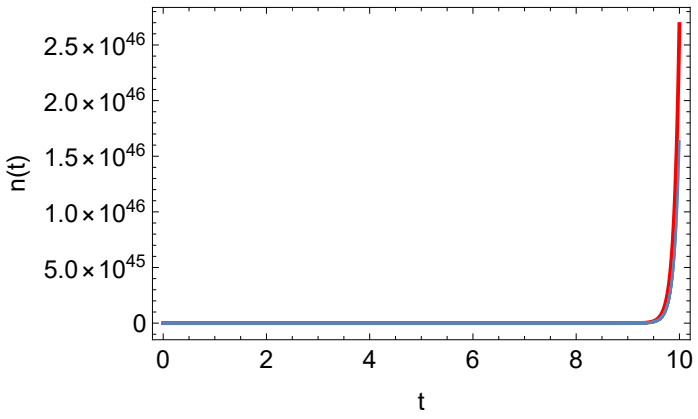
Out[299]=



Out[307]=