Three Examples

Growth-Decay
\[ \frac{dA}{dt} = kA(t), \]
\[ A(0) = A_0 \]
\[ A(t) = A_0 e^{kt} \]

Newton Cooling
\[ \frac{du}{dt} = -h(u(t) - u_1), \]
\[ u(0) = u_0 \]
\[ u(t) = u_1 + (u_0 - u_1) e^{-ht} \]

Verhulst Logistic
\[ \frac{dP}{dt} = (a - bP(t))P(t), \]
\[ P(0) = P_0 \]
\[ P(t) = \frac{aP_0}{bP_0 + (a - bP_0)e^{-at}} \]