Three Examples

Growth-Decay

$$\frac{dA}{dt} = kA(t),$$
$$A(0) = A_0$$

$$\boxed{A(t) = A_0 e^{kt}}$$

Newton Cooling

$$\frac{du}{dt} = -h(u(t) - u_1),$$
$$u(0) = u_0$$

$$\boxed{u(t) = u_1 + (u_0 - u_1)e^{-ht}}$$

Verhulst Logistic

$$\frac{dP}{dt} = (a - bP(t))P(t),$$
$$P(0) = P_0$$

$$\boxed{P(t) = \frac{aP_0}{bP_0 + (a - bP_0)e^{-at}}}$$