Variables:
Linear: Only constant coefficients are present → Linear or Nonlinear

= Order [Sum of orders of individual equations] ≥ Model N independent variables, N equations

1. Model Classification

Learning tasks:
General thinking 2 & 3. Static Space Representation, Simulation,
Closed Books, Closed Notes
Friday Mar 25
Review for Exam II
\[
\begin{align*}
\{\quad \Rightarrow \quad \text{Develop state equation from derivative chains} \\
\{ \quad \Rightarrow \quad \text{Substitute state variables into the model equations} \\
\end{align*}
\]

\[
\begin{align*}
\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} & = \begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} \\
& = \begin{bmatrix} 2, 2, 2 \\ 2, 2, 2 \\ 2, 2, 2 \end{bmatrix}
\end{align*}
\]

\[
\begin{align*}
\Rightarrow \quad \text{Assign state variables to elements of derivative chains} \\
\Rightarrow \quad \text{Identify derivative chains for each dependent variable.}
\end{align*}
\]
\[ y = 3x^3 + 2x \]

\[ 5x^3 + [475x^2 + 53x + 3] \]

Given that \( f(x) \) is a linear function and given data points of output \( y \), these in vector form:

\[ \chi_n = f_n(x_1, x_2, \ldots, x_n) \]

\[ \chi_2 = f_2(x_1, x_2), \ldots, x_n) \]

\[ \chi_1 = f_1(x_1, x_2, \ldots, x_n) \]

Let \( s \) be the solution of each entry of \( f \) as determined in the solution.
= ewise of ode lea + Miscellaneous Model statements (synthex)

= Euler method - not an exam

② Numerical Simulation

Instrumental Stimulation

University of Idaho
function xdot = AccelSpecifiedPendLinearizedDown(t,x)
% Define the parameters
m = 2; l = 1; c = 0.2; g = 9.81; a = 1;

% Define the input
a = a*(t < 0.1);

% Define the state equations
fdot = (l*x(2)*x(2) + m*l^2)*(x(1)*x(1)) - c*x(2)*x(2) - (m+l)*a + (l/2);
xdot = xdot(1);

% Linearization for equil theta=pi
rember that cos(pi) = -1

% Linearization for equil theta=pi
rember that cos(pi) = -1

% make xdot a column vector
xdot = xdot';

end
\[ S x 3 = S x 3 S x 3 + S x 3 S x 3 \]

When the linearized system is

\[ \begin{align*}
\frac{dn}{dt} & = \frac{dn}{dt} \\
\frac{dy}{dt} & = \frac{dy}{dt} \\
\frac{dz}{dt} & = \frac{dz}{dt} \\
\end{align*} \]

Choose an equilibrium state \( S x 3 \). Then complete Jacobian evaluated
\[ O = \left( o, x', y' \right) \]
\[ O = \left( o, x, y \right) \]
\[ O = \left( o, x, y \right) \]

Such that

\[ \left\{ \frac{v_n}{x_n} : \frac{v_n}{x_n} \right\} = \begin{pmatrix} 3x \end{pmatrix} \]

Find equilibrium states \( S x \) start with

\[ \left\{ \frac{v_n}{x_n} : \frac{v_n}{x_n} \right\} = \begin{pmatrix} x \end{pmatrix} \]

\[ \left\{ \frac{v_n}{x_n} : \frac{v_n}{x_n} \right\} = \begin{pmatrix} x \end{pmatrix} \]

Three states \( \circ \) Linearization