Course Name HW Assignment Number

Your Name Due Date

Problem 1: Problem Title

Your solution goes here. You can use inline math like $x = 5$ or display math:

$$f(x) = x^2 + 2x + 1 \tag{1}$$
$$= (x+1)^2 \tag{2}$$

(a)

Sub-problem solution here.

(b)

Another sub-problem solution here.

Problem 2: Code Example

You can include code using the provided environments:

```
% MATLAB code example
x = linspace(0, 2*pi, 100);
y = sin(x);
plot(x, y);
```

```
# Python code example
import numpy as np
x = np.linspace(0, 2*np.pi, 100)
y = np.sin(x)
```

```
$ python script.py
Output appears here
```

Problem 3: Including Graphics

You can include figures and reference them:

Problem 4: Math Comparison Operators

Use the new comparison shorthand commands in aligned math:

$$f(x) = x^2 + 1$$
$$f(x) > 0 \text{ for all } x$$
$$f(1) > f(0)$$
$$f(2) >> f(1)$$
$$0 < f(x)$$
$$f(-1) << f(2)$$
$$\omega_c \geq 10 \text{ rad/s}$$
$$\text{Error} \leq 5\%$$
$$K_p \neq 0$$
$$G(s) \approx H(s)$$

Problem 5: Example Boxes

Create highlighted example boxes:

Example 5-1: PID Controller Design

Given a plant transfer function $G_p(s) = \frac{10}{s(s+2)}$, design a PID controller $G_c(s) = K_p + \frac{K_i}{s} + K_d s$ to meet the following specifications:

- Steady-state error $< 2\%$ for step input
- Phase margin > 45
- Gain margin > 6 dB

Example 2-3: State Space Analysis

For the system $\dot{x} = Ax + Bu$, where:

$$A = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix}, \quad B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

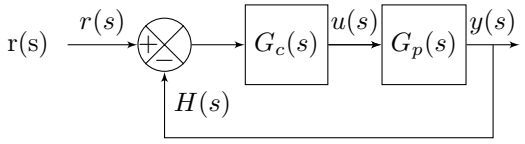
Find the eigenvalues and determine system stability.

Problem 6: Block Diagrams

Create centered block diagrams using the hwblocks environment with blox package commands:

(a)

Simple feedback control system:



(b)

Multi-input system with summing junction: