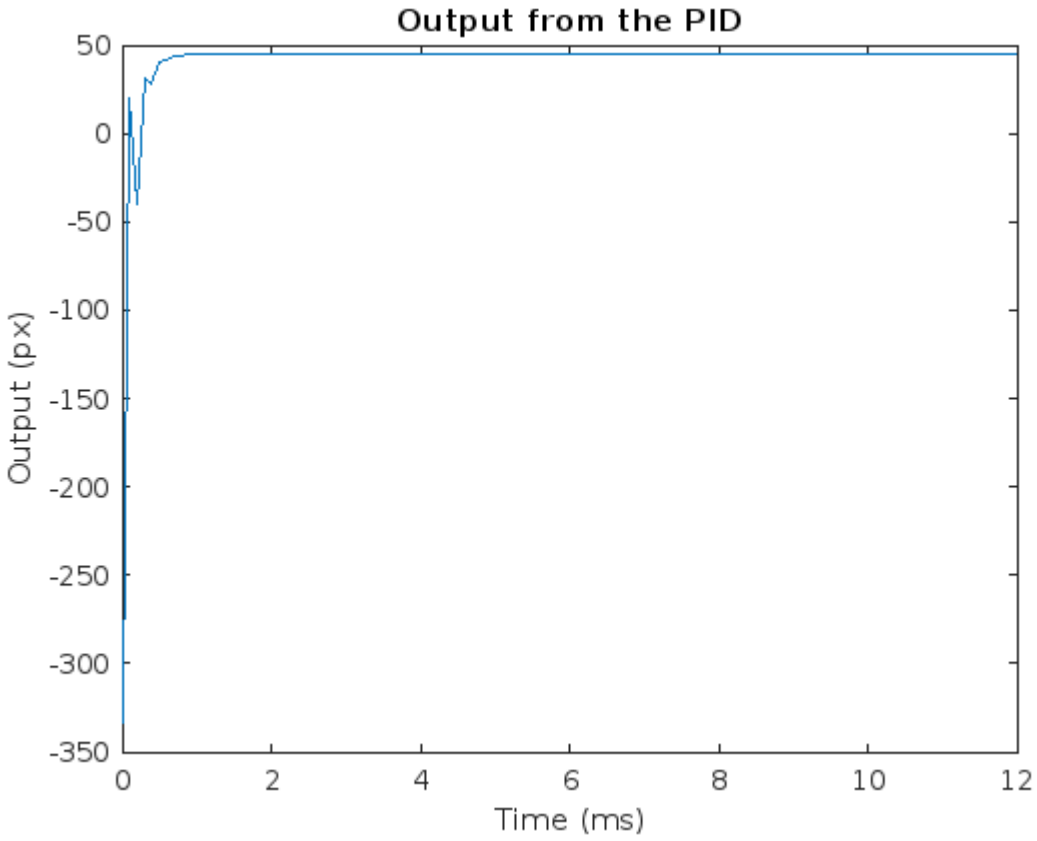
```
function index

% Desired Value = 45px -- Starting Value = 500px



    % Define the PID controller function
    pidControllerFunction = pidController(45, 0.1, 0.2, 0.1);

    % Initialize arrays to store time and output data
    time = 0:0.1:12; % Time vector from 0 to 12 milliseconds
    pidOutput = zeros(size(time)); % Initialize PID output array

    % Calculate initial PID output
    pidOutput(1) = pidControllerFunction(500);

    % Iterate over time steps
    for i = 2:numel(time)
        % Calculate PID output for current time step
        pidOutput(i) = pidControllerFunction(pidOutput(i-1));
    end

    % Plot the PID output
    plot(time, pidOutput);

    % Add title and labels
    title('Output from the PID');
    xlabel('Time (ms)');
    ylabel('Output (px)');
end


% PID Controller code
function pidController = pidController(desiredValue, P, I, D)
    % Initialize variables
    currentError = 0;
    integral = 0;
    previousError = 0;
    timeDifference = 3;

    % Define the nested function
    function output = controller(currentValue)
        % Calculate the error
        currentError = desiredValue - currentValue;

        % Update integral term
        integral = integral + (currentError * timeDifference);

        % Calculate derivative term
        derivative = (currentError - previousError) / timeDifference;

        % Calculate PID output
```

```
        output = P * currentError + I * integral + D * derivative;

        % Update previous error
        previousError = currentError;
    end

    % Assign the nested function to the output
    pidController = @controller;
end
```



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