

**ChE 436**  
**Special Problem 4**

1. Does the integral term in a PI controller always cause overshoot? Why or why not?

2. Compute the output from a PI controller at  $t=0, 5, 10, 15,$  and  $20$  sec assuming that the error is given in the figure below as a function of time. The controller parameters are  $K_c = 0.5$  and  $\tau_I = 5$  sec. For simplicity, assume  $U_{Bias} = 20\%$ . Please use Excel for this assignment. Please show both a list of numbers and corresponding plots for  $e(t)$ ,  $\int e(t)dt$ , and  $u(t)$ . Use 1 second intervals.

