Lab work #2

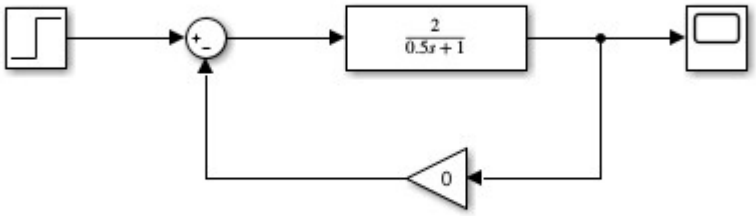
First-order system with feedback

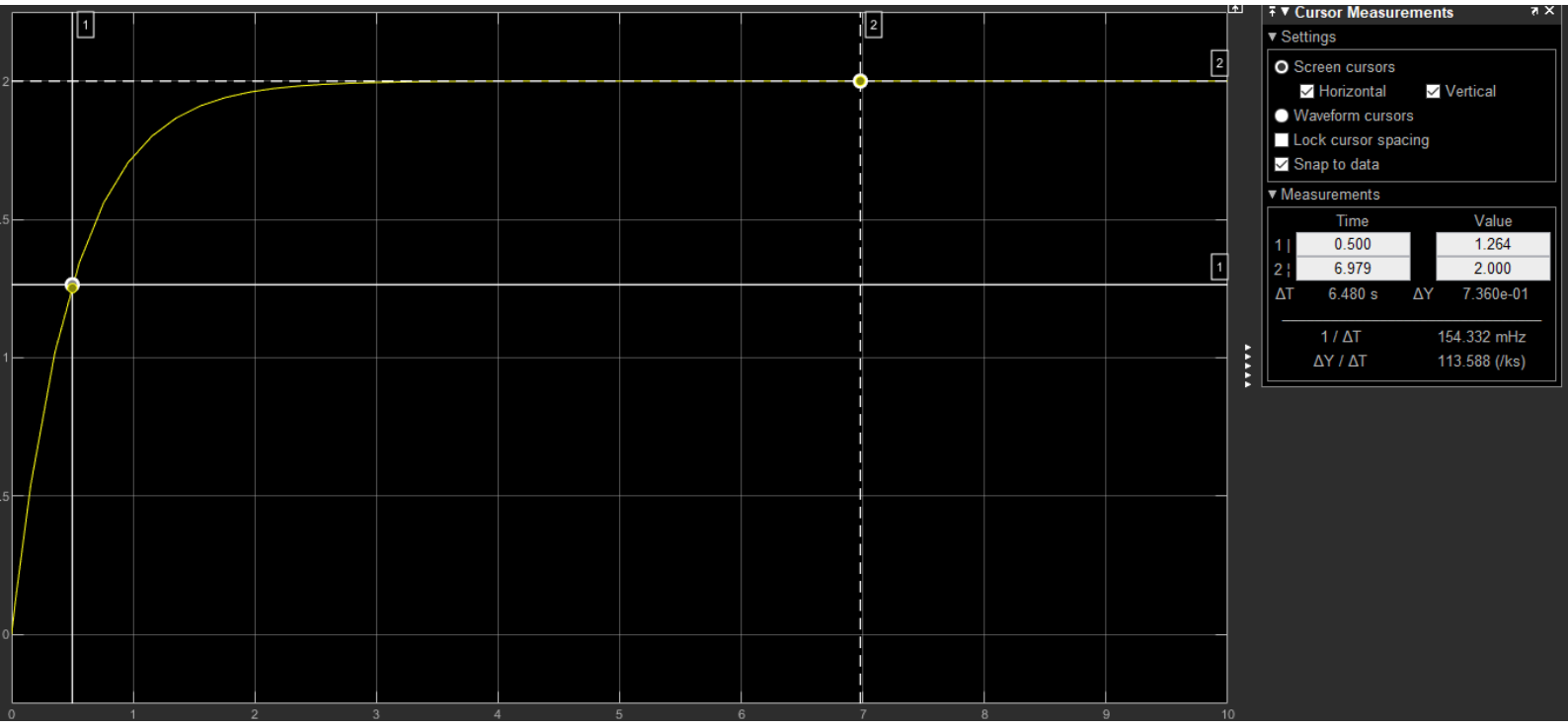
$$W_1 = \frac{k}{T_{EQ} + 1} = \frac{2}{0.5 + 1} = 1.33$$

$$K_{EQ} = \frac{k}{1 + k * k_F} = \frac{2}{1} = 2.00$$

$$T_{EQ} = \frac{T}{1 + k * k_F} = \frac{0.5}{1} = 0.5$$

$$W_f(s) = 0$$



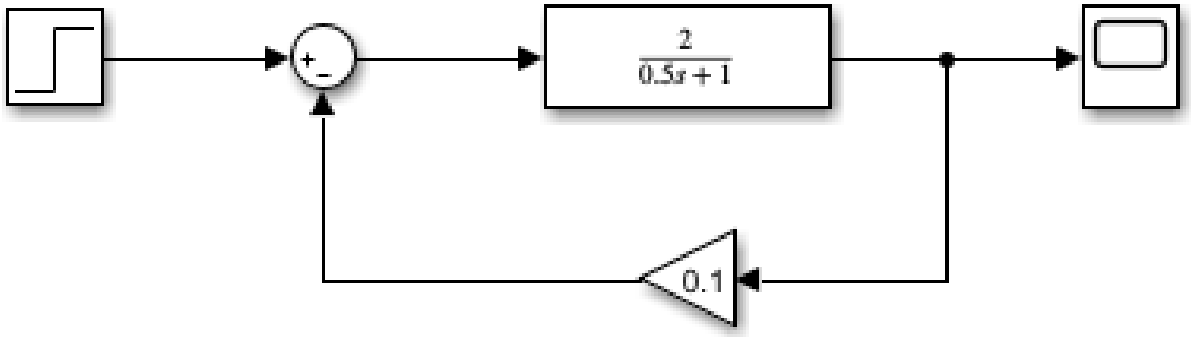


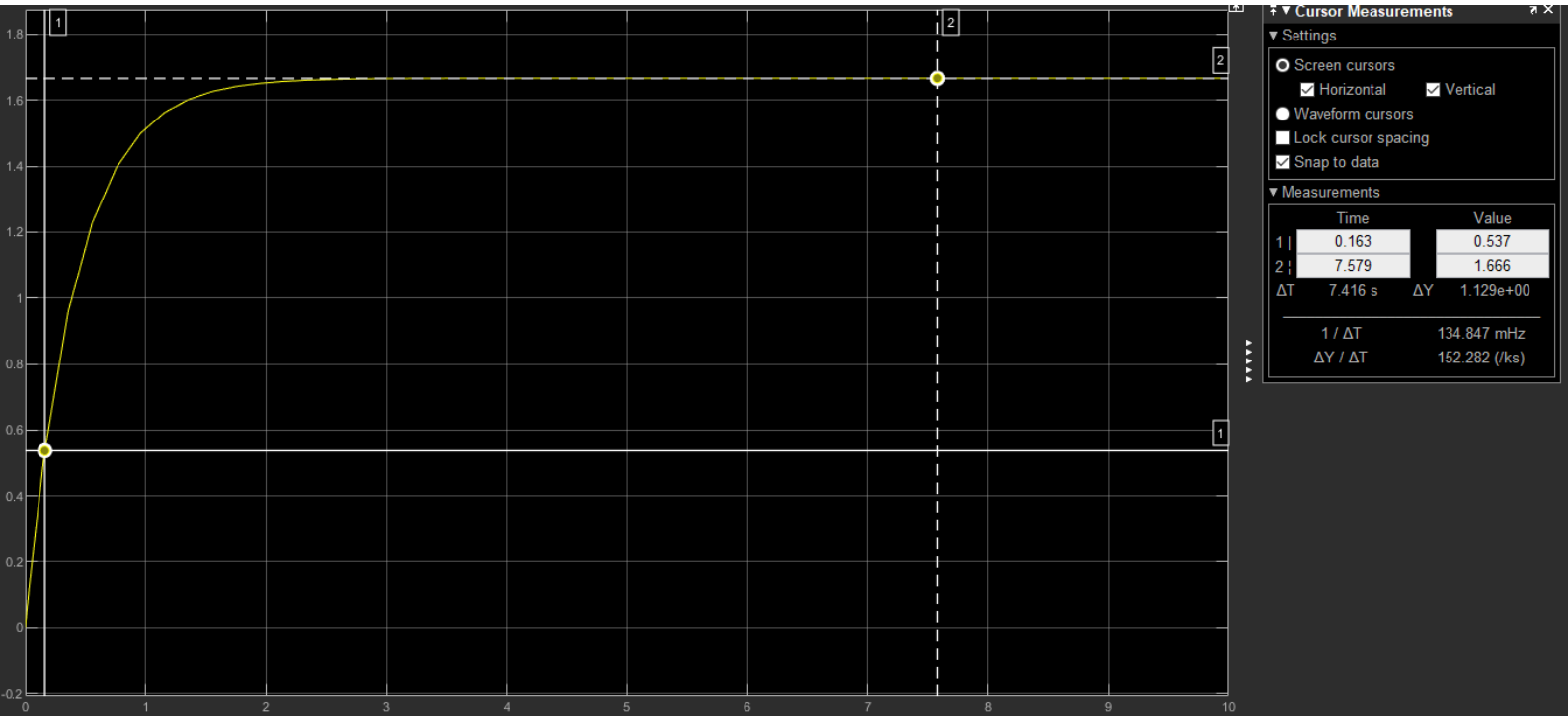
$$W_2 = \frac{k}{Ts + 1} = 1.43$$

$$K_{EQ} = \frac{k}{1 + k * k_F} = \frac{2}{1 + 2 * 0{,}1} = 1.6666$$

$$T_{EQ} = \frac{T}{1 + k * k_F} = \frac{0.5}{1 + 2 * 0.1} = 0.1613$$

$$W_f(s) = 0.1$$



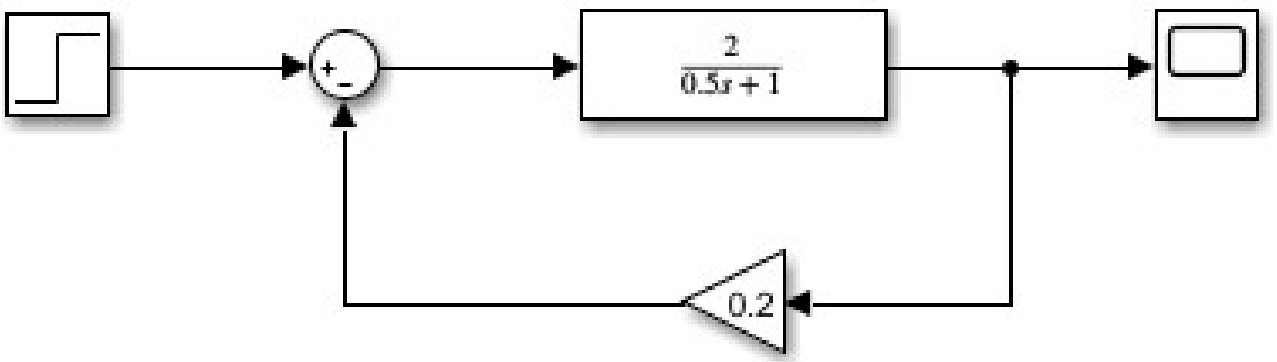


$$W_3 = \frac{k}{Ts + 1} = 1.0538$$

$$K_{EQ} = \frac{k}{1 + k * k_F} = \frac{2}{1 + 2 * 0.2} = 1.43$$

$$T_{EQ} = \frac{T}{1 + k * k_F} = \frac{0.5}{1 + 2 * 0.2} = 0.357$$

$$W_f(s) = 0.2$$

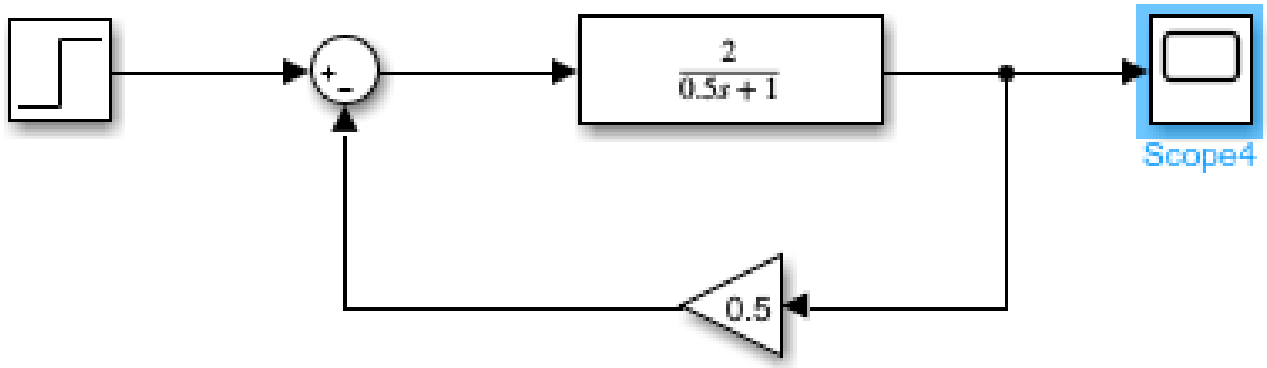


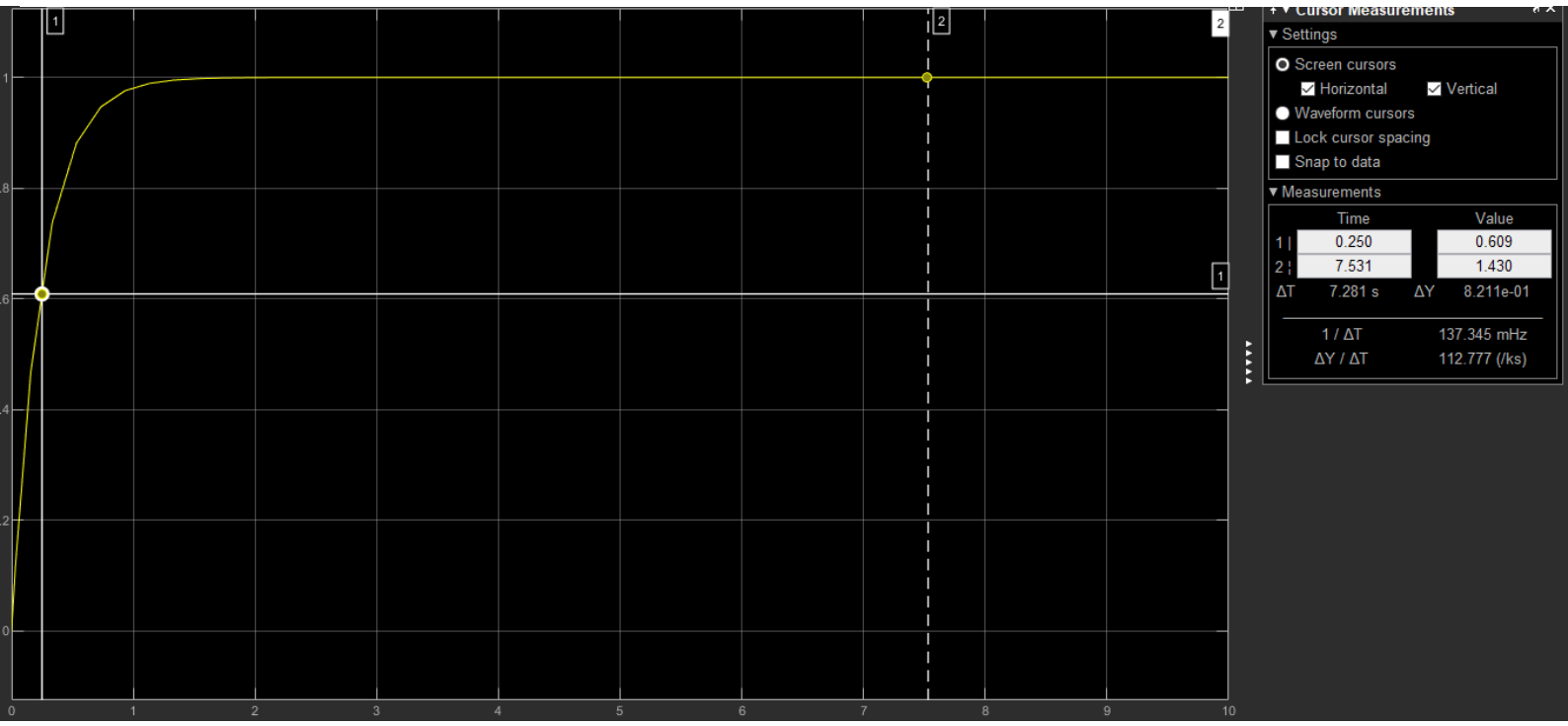
$$W_4 = \frac{k}{Ts + 1} = 0.8$$

$$K_{EQ} = \frac{k}{1 + k * k_F} = \frac{2}{1 + 2 * 0.5} = 1$$

$$T_{EQ} = \frac{T}{1 + k * k_F} = \frac{0.5}{1 + 2 * 0.5} = 0.25$$

$$W_f(s) = 0.5$$



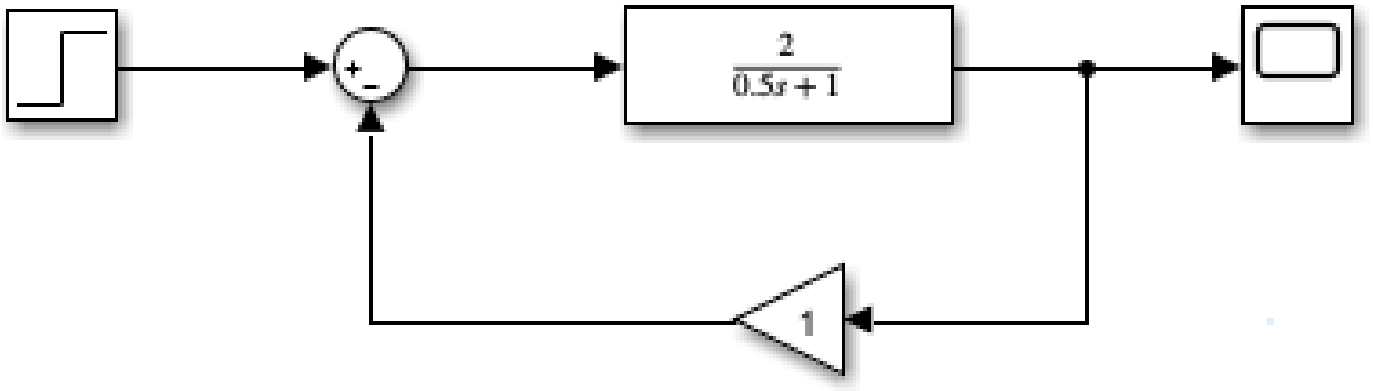


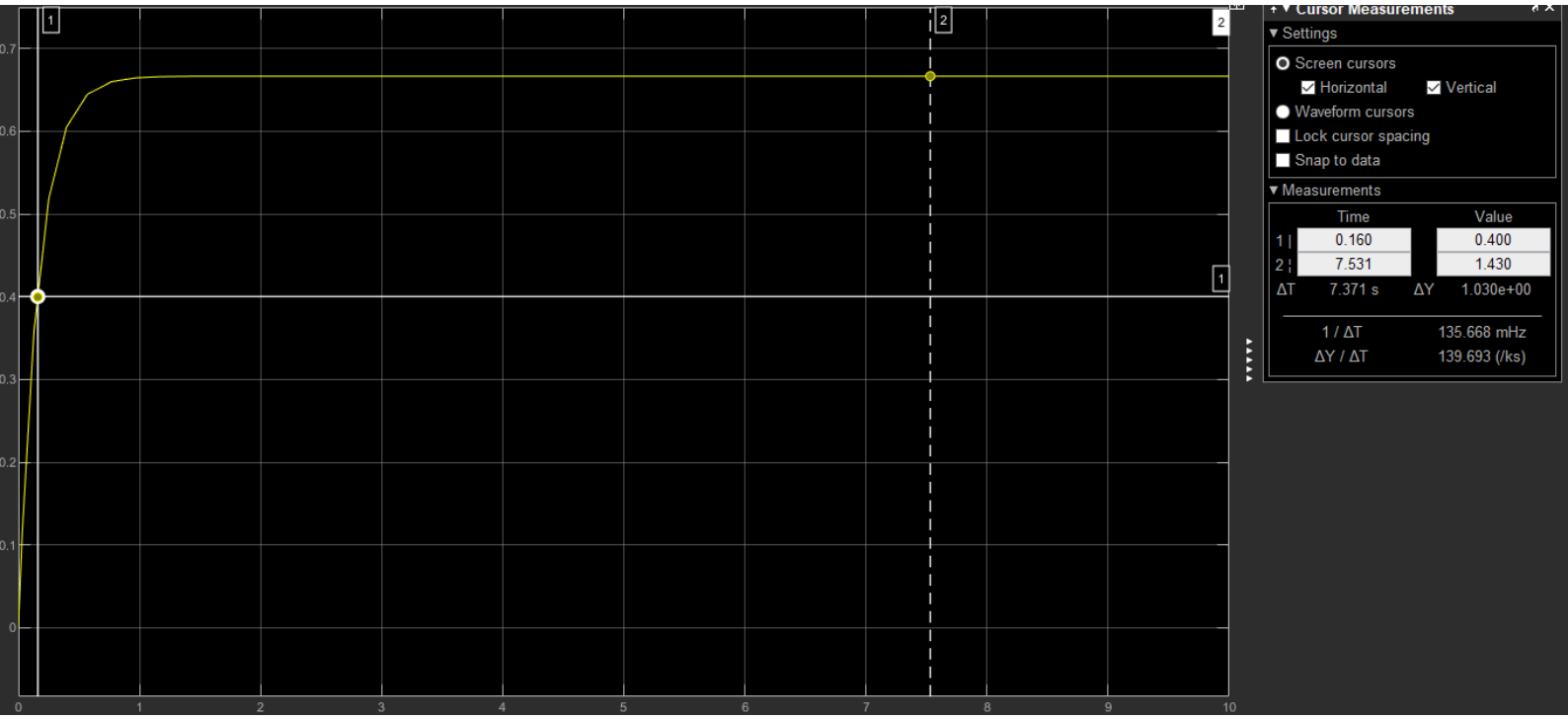
$$W_5 = \frac{k}{Ts + 1} = 0.566038$$

$$K_{EQ} = \frac{k}{1 + k * k_F} = \frac{2}{1 + 2 * 1} = 0.666$$

$$T_{EQ} = \frac{T}{1 + k * k_F} = \frac{0.5}{1 + 2 * 1} = 0.166$$

$$W_f(s) = 1$$





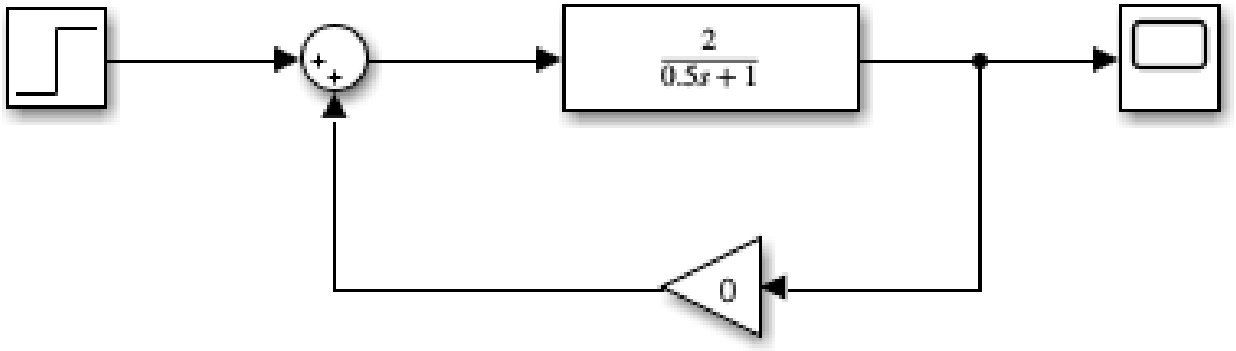
For Positive Feedback

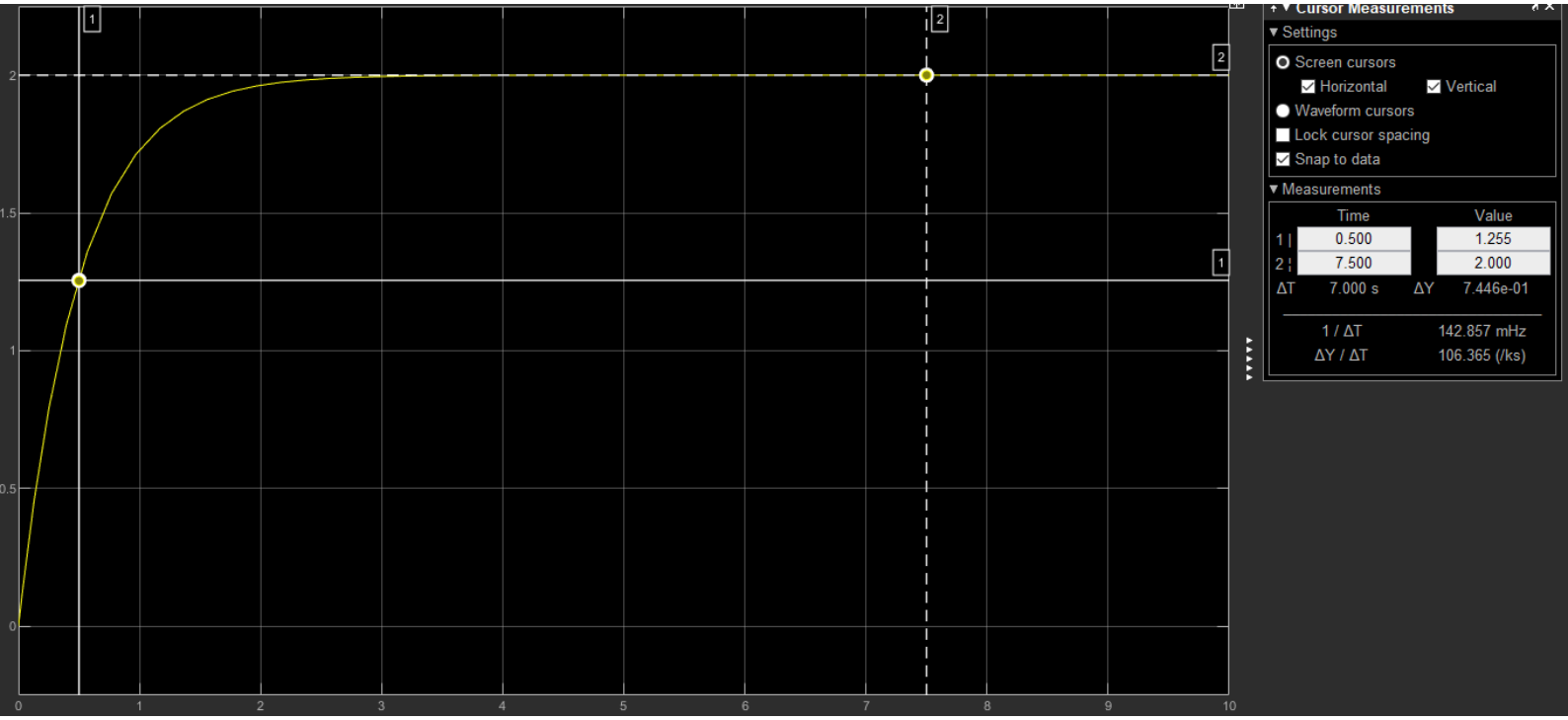
$$W_1 = \frac{k}{Ts + 1} = 1.33$$

$$K_{EQ} = \frac{k}{1 + k * k_F} = \frac{2}{1 + 2 * 0} = 2$$

$$T_{EQ} = \frac{T}{1 + k * k_F} = \frac{0.5}{1 + 2 * 0} = 0.5$$

$$W_f(s) = 0$$



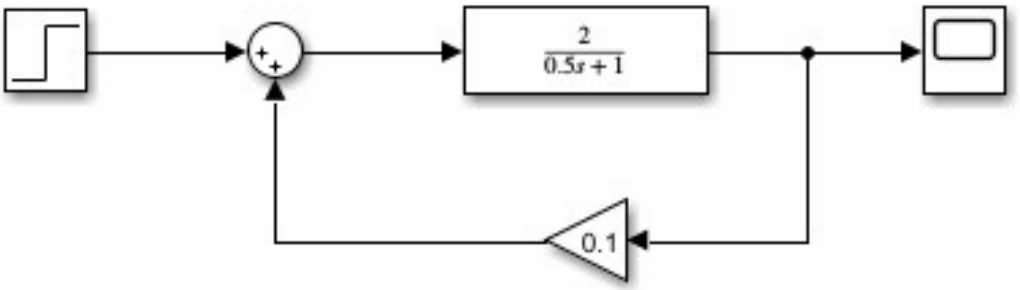


$$W_2 = \frac{k}{Ts + 1} = 1.43$$

$$K_{EQ} = \frac{k}{1 + k * k_F} = \frac{2}{1 + 2 * 0.1} = 1.666$$

$$T_{EQ} = \frac{T}{1 + k * k_F} = \frac{0.5}{1 + 2 * 0.1} = 0.1613$$

$$W_f(s) = 0.1$$

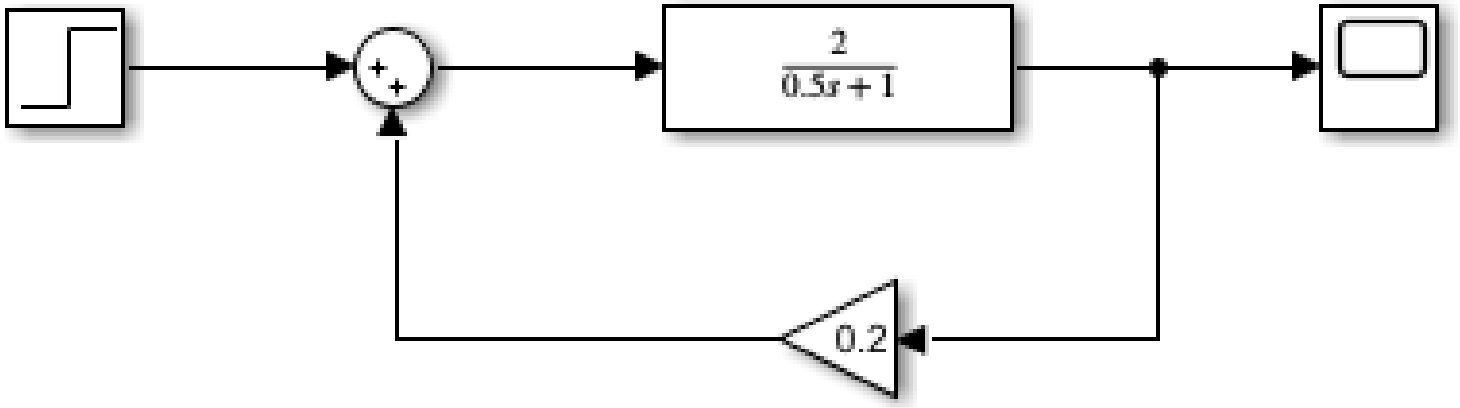


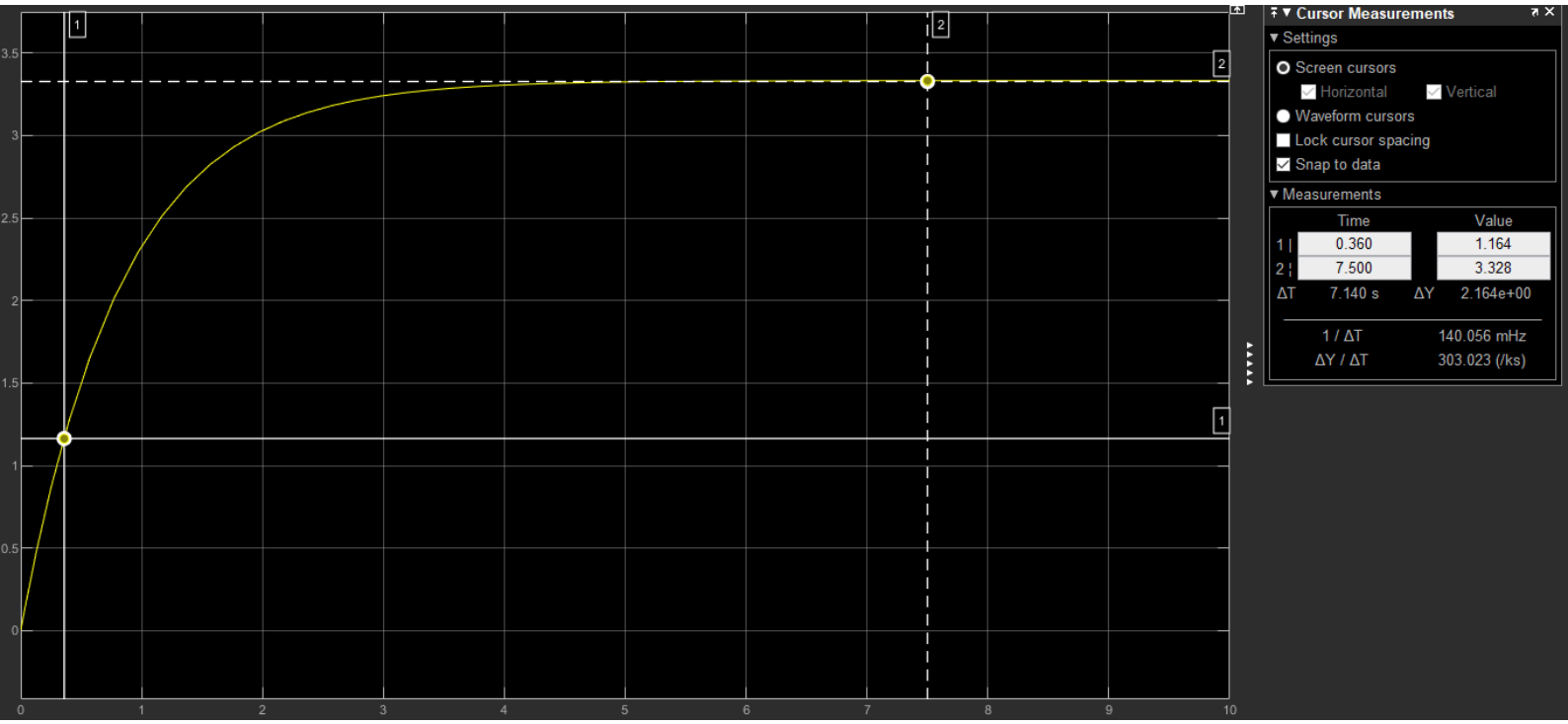
$$W_3 = \frac{k}{Ts + 1} = 1.05$$

$$K_{EQ} = \frac{k}{1 + k * k_F} = \frac{2}{1 + 2 * 0.2} = 1.43$$

$$T_{EQ} = \frac{T}{1 + k * k_F} = \frac{0.5}{1 + 2 * 0.2} = 0.36$$

$$W_f(s) = 0.2$$



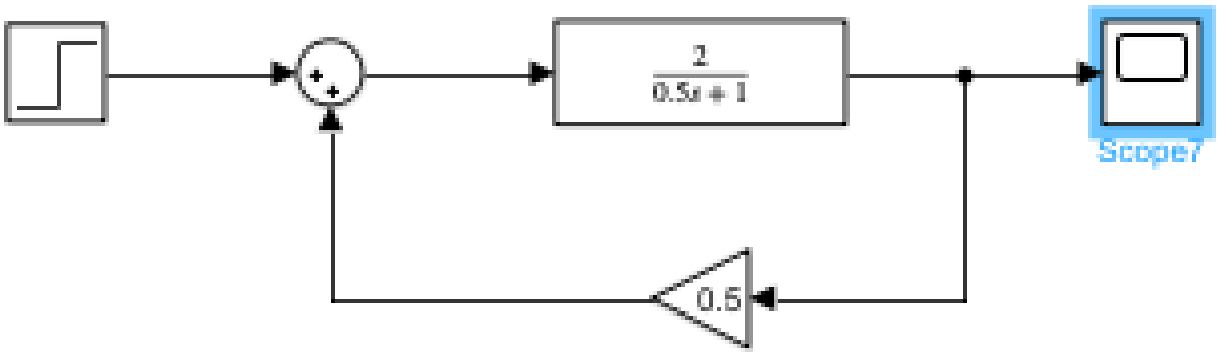


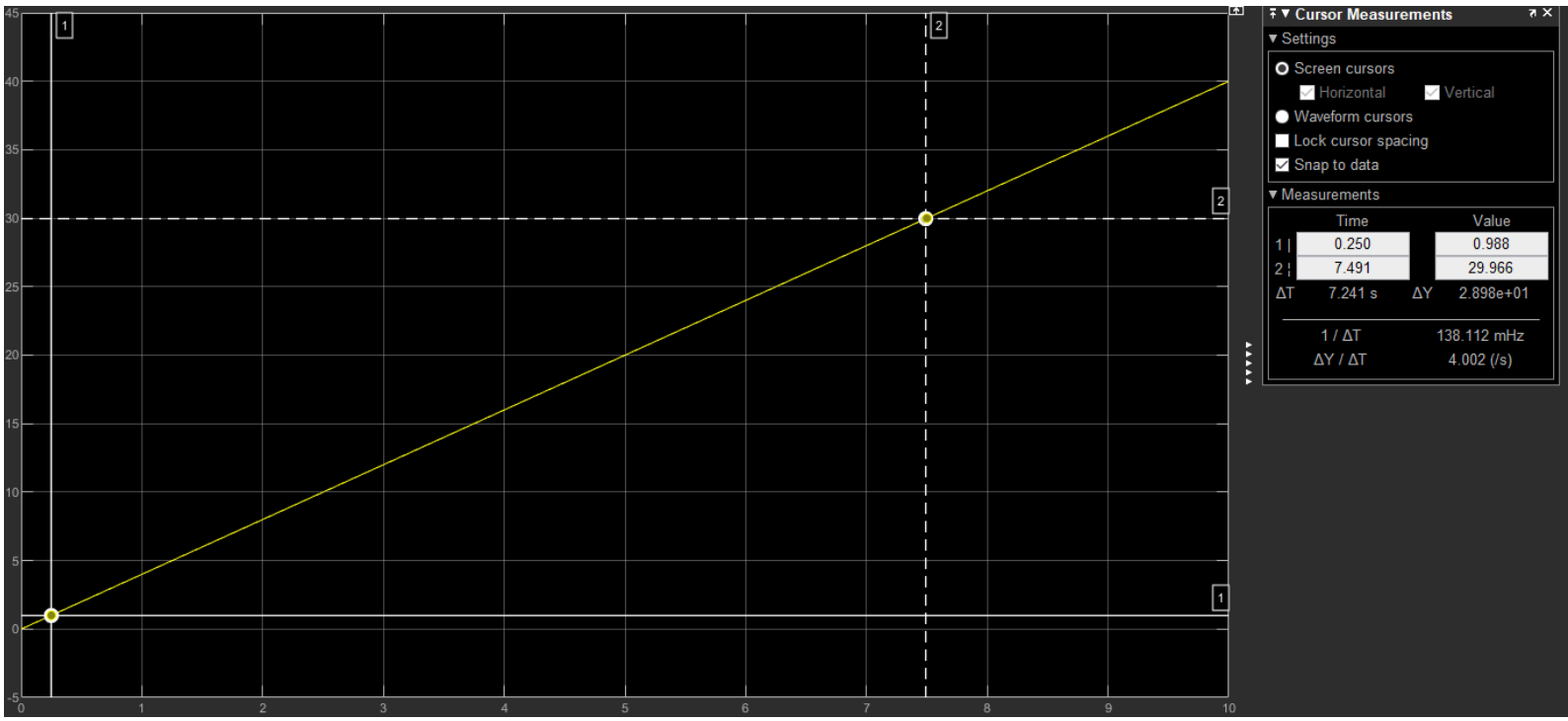
$$W_4 = \frac{k}{Ts + 1} = 0.8$$

$$K_{EQ} = \frac{k}{1 + k * k_F} = \frac{2}{1 + 2 * 0.5} = 1$$

$$T_{EQ} = \frac{T}{1 + k * k_F} = \frac{0.5}{1 + 2 * 0.5} = 0.25$$

$$W_f(s) = 0.5$$



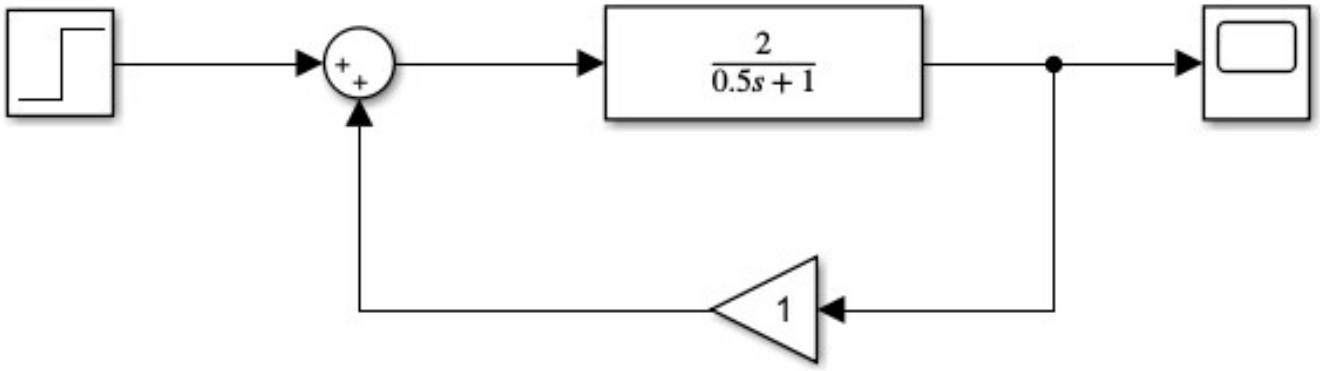


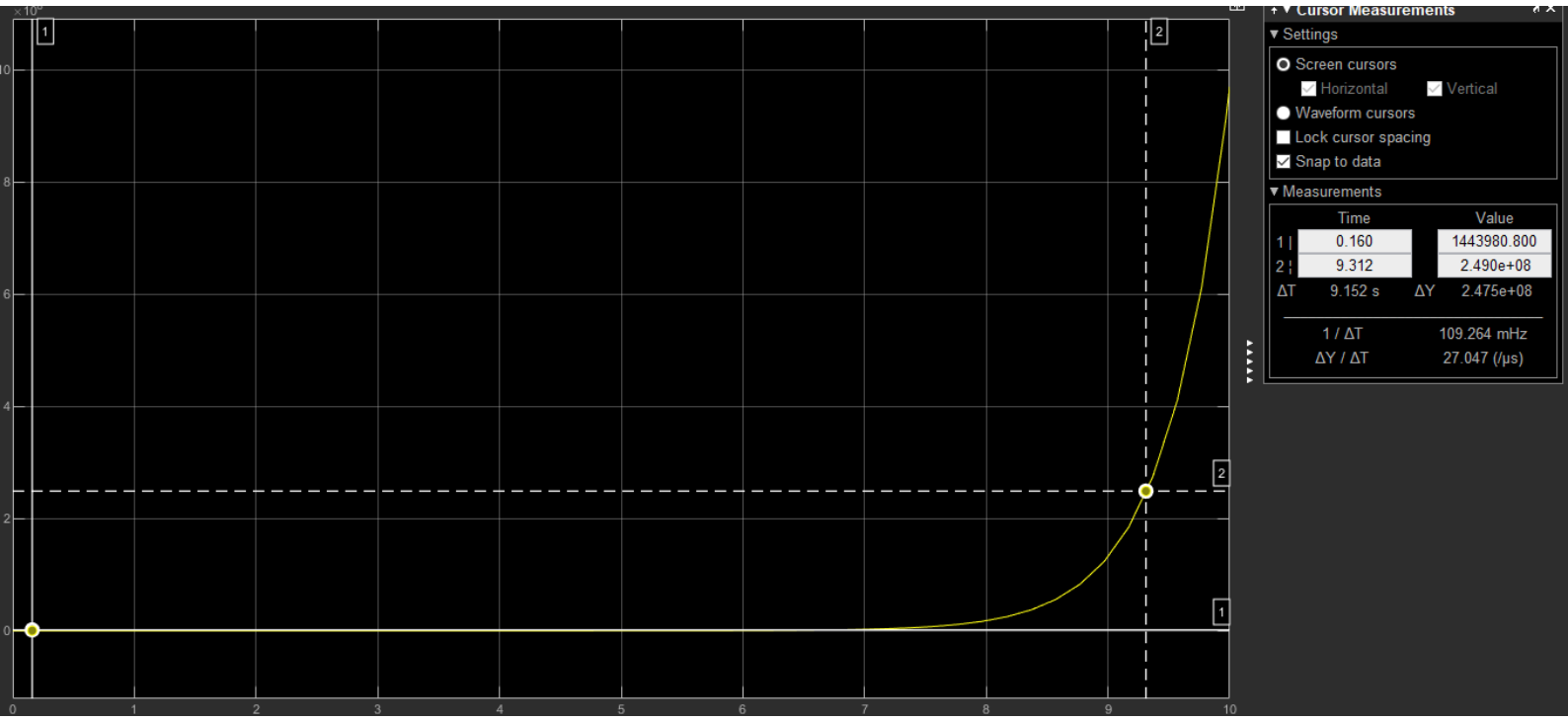
$$W_5 = \frac{k}{Ts + 1} = 0.569$$

$$K_{EQ} = \frac{k}{1 + k * k_F} = \frac{2}{1 + 2 * 1} = 0.66$$

$$T_{EQ} = \frac{T}{1 + k * k_F} = \frac{0.5}{1 + 2 * 1} = 0.16$$

$$W_f(s) = 1$$





Negative Feedback			
Evaluated		Calculated	
Keq	Teq	Keq	Teq
2	0.55	2	0.5
1.66	0.798	1.66	0.1613
1.43	0.49	1.43	0.357
1.43	0.44	1	0.25
1.43	0.328	0.666	0.166

Positive Feedback			
Evaluated		Calculated	
Keq	Teq	Keq	Teq
2	0.547	2	0.5
2.5	0.538	1.66	0.1613
3.328	0.36	1.43	0.36
29.966	0.25	1	0.25
2.49E+08	0.17	0.66	0.16