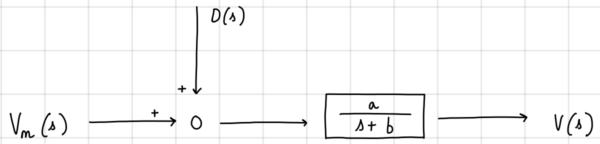
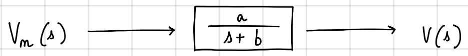
LAB 2 – PREPARATION REPORT



Given $D(s) = 0$, we can redraw this as:



$v_m(t) = V_0 \cdot 1(t) \implies V_m(s) = \frac{V_0}{s}, \quad V_0 > 0$

$v(0) = 0$

We need the final value theorem to determine $v(\infty) = \lim_{t \to \infty} v(t)$ in terms of V_0, a, b.

By FVT, $v(\infty) = \lim_{t\to\infty} v(t) = \lim_{s \to 0} s \cdot V(s)$

$$V(s) = V_m(s) \cdot G(s) = \frac{V_0}{s} \cdot \frac{a}{s+b}$$

In order to be able to use the final value theorem, we have to ensure that the poles of this system are in the OLHP. $G(s)$ has 1 pole $(p = -b)$, which satisfies this condition. Hence, we can use the FVT:

$$\lim_{t\to\infty} v(t) = \lim_{s\to 0} s \cdot V(s) = \lim_{s\to 0} s \cdot \frac{V_0}{s} \cdot \frac{a}{s+b} = \lim_{s \to 0} \frac{a V_0}{s+b} = \frac{a \cdot V_0}{b}$$

$$\boxed{\text{Answer: } \quad v(\infty) = \lim_{t\to\infty} v(t) = \frac{a \cdot V_0}{b}}$$