BME 444
HW 1 - Key

1. Find $G(s) = V_o(s)/V_i(s)$ for the circuit shown below using mesh analysis.

$$\frac{3s^2}{6s^3 + 5s^2 + 4s + 2}$$

2. Find $G(s) = V_o(s)/V_i(s)$ for the circuit shown below using nodal analysis.

$$\frac{s^2 + 2s + 2}{s^4 + 2s^3 + 3s^2 + 3s + 2}$$

3. Find $G(s) = X_2(s)/F(s)$ for the translational system shown below.

$$\frac{4s + 3}{4s(4s + 1)}$$

4. Find $G(s) = X_3(s)/F(s)$ for the translational system shown below.

$$\frac{3}{2s\left(4s^3 + 6s^2 + 13s + 9\right)}$$

5. Find $G(s) = \theta_1(s)/T(s)$ for the rotational system shown below.

$$\frac{s + 9}{15s^4 + 32s^3 + 95s^2 + 99s + 27}$$

6. Find $G(s) = \theta_1(s)/T(s)$ for the rotational system shown below.

$$\frac{s^2 + s + 2}{s^4 + 2s^3 + 3s^2 + s + 1}$$

7. The dye bromosulfophthalein (BSP) is used to assess liver function. Find $G(s) = M_4(s)/M_o(s)$ for the compartment model of liver shown below. Assume all $k = 1\ s^{-1}$.

$$\frac{1.}{s^4 + 7.s^3 + 15.s^2 + 10.s + 2.}$$

8. Find $G(s) = H_2(s)/Q(s)$ for the hydraulic system shown below.

$$\frac{0.000101937.}{2s^2 + 5s + 2}$$