Reducing the following block diagram to a single transfer function.

(a) Cascade form:
(b) Parallel form:

\[ F(s) \quad G1(s) \quad G2(s) \quad Y(s) \]

(c) Feedback form:

\[ F(s) + G(s) \quad Y(s) \]

\[ H(s) \]
(d) Proportional cascade feedback form

\[ F(s) + K \rightarrow G(s) \rightarrow Y(s) \]

(e) Differential cascade feedback form:

\[ F(s) + 1 + ks \rightarrow G(s) \rightarrow Y(s) \]
(f) Integral cascade feedback form:
Consider the following feedback scheme with a proportional cascade compensator. Reduce the block diagram into a single block. Express the poles and zeros of the transfer function as a function of $a$, $b$, $c$, & $K$. Estimate the steady state error.

\[
\frac{1}{as^2 + bs + c}
\]
(3) Consider the following feedback scheme with a PD cascade compensator. Reduce the block diagram into a single block. Express the poles and zeros of the transfer function as a function of $a$, $b$, $c$, $K$, & $K_1$. Estimate the steady state error.
(4) Consider the following feedback scheme with a PI cascade compensator. Reduce the block diagram into a single block. Express the zeros of the transfer function as a function of \( a, b, c, K_1 \) and \( K_2 \). What is the number of poles? Estimate the steady state error. You do not need to evaluate the pole positions explicitly. In the lab, you will be provided with values for these coefficients and the poles positions can be solved using MatLab.