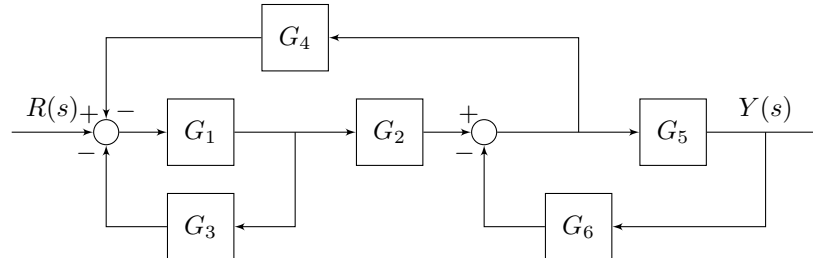


# ISS Final test (group 1)

## Block diagram transformations

Perform block diagram reduction and determine the single transfer function  $\frac{Y(s)}{R(s)}$ .



## Fuzzy logic

Using the Zadeh s and t-norm and Mamdani's implication, calculate the value of  $z$  for given values  $x$  and  $y$ .

$$\mu_A(x) = \left\{ \frac{0.2}{1}, \frac{0.7}{2}, \frac{0.9}{3}, \frac{1.0}{4}, \frac{0.1}{5} \right\}$$

$$\mu_B(y) = \left\{ \frac{1.0}{10}, \frac{0.8}{20}, \frac{0.4}{30}, \frac{0.2}{40}, \frac{0.1}{50} \right\}$$

$$\mu_N(z) = \left\{ \frac{0.2}{-1}, \frac{0.5}{0}, \frac{1.0}{1} \right\}$$

$$\mu_M(z) = \left\{ \frac{0.7}{-1}, \frac{0.9}{0}, \frac{0.2}{1} \right\}$$

$$\mu_K(z) = \left\{ \frac{0.2}{-1}, \frac{0.6}{0}, \frac{0.9}{1} \right\}$$

1. if  $y$  is  $\neg B$  then  $z$  is  $N$
2. if  $x$  is  $A \wedge y$  is  $B$  then  $z$  is  $M$
3. if  $x$  is  $\neg A \wedge y$  is  $B$  then  $z$  is  $\neg K$

$$x = 2; y = 30; z = ?$$

# ISS Final test (group 2)

## Fuzzy logic

Using the Zadeh s and t-norm and Mamdani's implication, calculate the value of  $z$  for given values  $x$  and  $y$ .

$$\mu_A(x) = \left\{ \frac{0.1}{2}, \frac{0.5}{3}, \frac{0.6}{5}, \frac{0.7}{7}, \frac{0.9}{11} \right\}$$

$$\mu_B(y) = \left\{ \frac{0.7}{-1}, \frac{0.8}{0}, \frac{0.4}{1} \right\}$$

$$\mu_N(z) = \left\{ \frac{0.1}{10}, \frac{0.3}{20}, \frac{0.4}{30} \right\}$$

$$\mu_M(z) = \left\{ \frac{0.2}{10}, \frac{0.2}{20}, \frac{0.5}{30} \right\}$$

$$\mu_K(z) = \left\{ \frac{0.3}{10}, \frac{0.8}{20}, \frac{0.9}{30} \right\}$$

1. if  $x$  is  $A \vee y$  is  $B$  then  $z$  is  $\neg N$
2. if  $x$  is  $\neg A$  then  $z$  is  $\neg M$
3. if  $x$  is  $\neg A \wedge y$  is  $\neg B$  then  $z$  is  $K$

$$x = 7; y = 1; z = ?$$

# ISS Final test (group 3)

## Fuzzy logic

Using the Zadeh s and t-norm and Mamdani's implication, calculate the value of  $z$  for given values  $x$  and  $y$ .

$$\mu_A(x) = \left\{ \frac{0.2}{1}, \frac{0.3}{2}, \frac{0.7}{3}, \frac{0.9}{4}, \frac{1.0}{5} \right\}$$

$$\mu_B(y) = \left\{ \frac{0.0}{1}, \frac{0.2}{2}, \frac{0.3}{3}, \frac{0.4}{4}, \frac{0.6}{5} \right\}$$

$$\mu_N(z) = \left\{ \frac{0.2}{15}, \frac{0.4}{45}, \frac{0.7}{60} \right\}$$

$$\mu_M(z) = \left\{ \frac{0.9}{15}, \frac{0.8}{45}, \frac{0.4}{60} \right\}$$

$$\mu_K(z) = \left\{ \frac{0.2}{15}, \frac{0.5}{45}, \frac{1.0}{60} \right\}$$

1. if  $x$  is  $A \wedge y$  is  $B$  then  $z$  is  $N$
2. if  $y$  is  $B$  then  $z$  is  $\neg M$
3. if  $x$  is  $\neg A \vee y$  is  $\neg B$  then  $z$  is  $K$

$$x = 5; y = 3; z = ?$$

# ISS Final test (group 4)

## Fuzzy logic

Using the Zadeh s and t-norm and Mamdani's implication, calculate the value of  $z$  for given values  $x$  and  $y$ .

$$\mu_A(x) = \left\{ \frac{0.7}{-2}, \frac{0.5}{-1}, \frac{0.2}{0}, \frac{0.5}{1}, \frac{0.7}{2} \right\}$$

$$\mu_B(y) = \left\{ \frac{0.3}{0}, \frac{0.2}{0.1}, \frac{0.2}{0.2}, \frac{0.8}{0.3} \right\}$$

$$\mu_N(z) = \left\{ \frac{0.1}{1}, \frac{0.2}{3}, \frac{0.5}{11} \right\}$$

$$\mu_M(z) = \left\{ \frac{0.4}{1}, \frac{0.1}{3}, \frac{0.7}{11} \right\}$$

$$\mu_K(z) = \left\{ \frac{0.2}{1}, \frac{0.6}{3}, \frac{0.9}{11} \right\}$$

1. if  $x$  is  $A$  then  $z$  is  $\neg N$
2. if  $y$  is  $\neg B \vee x$  is  $\neg A$  then  $z$  is  $M$
3. if  $x$  is  $A \wedge y$  is  $\neg B$  then  $z$  is  $\neg K$

$$x = -2; y = 0.3; z = ?$$