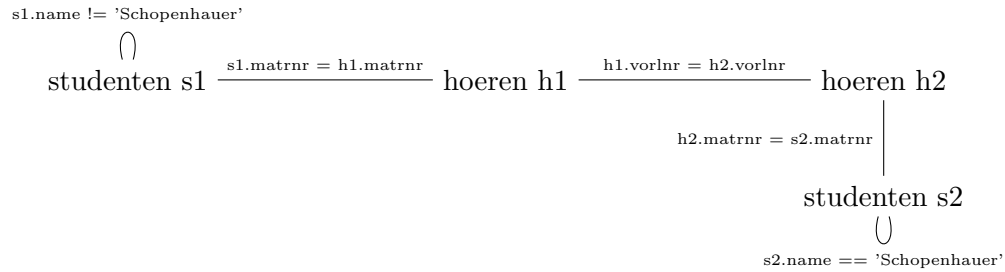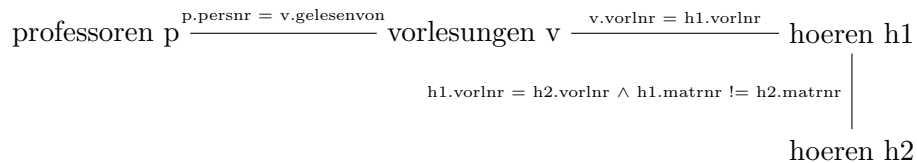# Exercise Sheet 3

Exercise 1

Give the query graphs for the two queries from the first exercise sheet.

```
SELECT s1.name
FROM studenten s1
JOIN hoeren h1 ON s1.matrnr = h1.matrnr
JOIN hoeren h2 ON h1.vorlnr = h2.vorlnr
JOIN studenten s2 ON h2.matrnr = s2.matrnr
WHERE s2.name = 'Schopenhauer'
AND s1.name != 'Schopenhauer';
```

s1.name != 'Schopenhauer'

$\bigcap$

studenten s1 $\underline{\quad s1.matrnr = h1.matrnr \quad}$ hoeren h1 $\underline{\quad h1.vorlnr = h2.vorlnr \quad}$ hoeren h2

h2.matrnr = s2.matrnr

studenten s2

$\bigcup$

s2.name == 'Schopenhauer'

```
SELECT p.persnr, p.name
FROM professoren p
JOIN vorlesungen v ON v.gelesenvon = p.persnr
JOIN hoeren h1 ON h1.vorlnr = v.vorlnr
JOIN hoeren h2 ON h2.vorlnr = h1.vorlnr
WHERE h1.matrnr != h2.matrnr;
```

professoren p $\underline{\quad p.persnr = v.gelesenvon \quad}$ vorlesungen v $\underline{\quad v.vorlnr = h1.vorlnr \quad}$ hoeren h1

h1.vorlnr = h2.vorlnr $\wedge$ h1.matrnr != h2.matrnr

hoeren h2

Exercise 2

$|R_1| = 1, |R_2| = 40, |R_3| = 40, |R_4| = 1, f_{1,2} = 0.75, f_{2,3} = 0.01, f_{3,4} = 0.75$

$$R_1 \xrightarrow[\ \ \ \ \ ]{f_{1,2} = 0.75} R_2 \xrightarrow[\ \ \ \ \ ]{f_{2,3} = 0.01} R_3 \xrightarrow[\ \ \ \ \ ]{f_{3,4} = 0.75} R_4$$

$\quad$ 1 $\qquad\qquad\qquad$ 40 $\qquad\qquad\qquad$ 40 $\qquad\qquad\qquad$ 1

X	C_{out}	$|X|$
$R_1 \bowtie R_2$	30	30
$R_2 \bowtie R_3$	16	16
$R_3 \bowtie R_4$	30	30
$R_1 X R_3$	40	40
$R_1 X R_4$	1	1
$(R_1 \bowtie R_2) \bowtie R_3$	42	12
$(R_2 \bowtie R_3) \bowtie R_1$	28	12
$(R_1 X R_3) \bowtie R_2$	52	12
$(R_1 X R_3) \bowtie R_4$	70	30
$(R_1 X R_4) \bowtie R_2$	31	30
$(R_1 \bowtie R_2) \bowtie (R_3 \bowtie R_4)$	69	9
$(R_1 X R_3) \bowtie (R_2 X R_4)$	90	9
$\color{red}{(R_1 X R_4) \bowtie (R_2 \bowtie R_3)}$	$\color{red}{26}$	$\color{red}{9}$
$((R_1 \bowtie R_2) \bowtie R_3) \bowtie R_4$	51	9
$((R_2 \bowtie R_3) \bowtie R_1) \bowtie R_4$	37	9
$((R_1 X R_3) \bowtie R_2) \bowtie R_4$	61	9
$((R_1 X R_3) \bowtie R_4) \bowtie R_2$	79	9
$((R_1 X R_4) \bowtie R_2) \bowtie R_3$	40	9