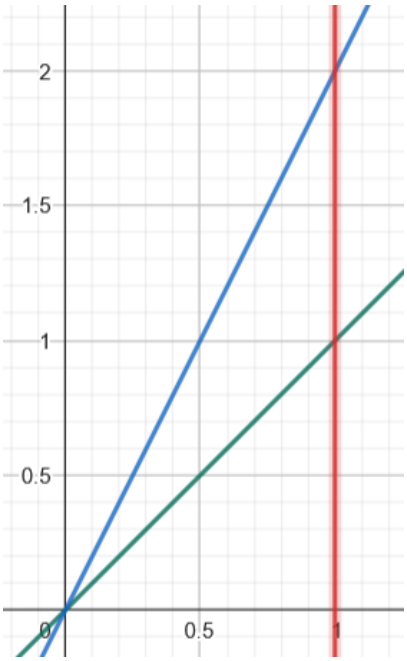
Opgave 9.5.56

Use the region R with the indicated boundaries to evaluate each double integral

$$\iint_R x^2y^2 \; dy \; dx; \; R \; is \; bounded \; by \;\; y = x, \; y = 2x, \; x = 1$$

Se billede nedenfor



— s. 559

Opskriv

$$R = 0 \leq x \leq 1$$
$$x \leq y \leq 2x$$

$$\iint_R x^2y^2 \; dy \; dx$$

$$\int_0^1 \int_x^{2x} x^2y^2 \; dy \; dx$$

Udregn

$$
\begin{aligned}
&\int_0^1 \int_x^{2x} x^2 y^2 \; dy \; dx \\
&\int_0^1 x^2 \int_x^{2x} y^2 \; dy \; dx \\
&\int_0^1 x^2 \left[\frac{1}{3} y^3 \right]_{y=x}^{y=2x} \; dx \\
&\int_0^1 \frac{1}{3} x^2 (8x^3 - x^3) \; dx \\
&\int_0^1 \frac{1}{3} x^2 7x^3 \; dx \\
&\int_0^1 \frac{7}{3} x^5 \; dx \\
&\left[\frac{7}{18} x^6 \right]_0^1 \\
= &\frac{7}{18}
\end{aligned}
$$