Opgave 4.3.47

> alcium Kinetics A function used to describe the kinetics of calcium in the cytogel (the gel of cell cytoplasm in the epithe- lium, an external tissue of epidermal cells) is given by
>
> $$R(c) = \frac{ac^2}{1 + bc^2} - kc,$$
>
> where $R(c)$ measures the release of calcium; c is the amount of free calcium outside the vesicles in which it is stored; and a, b, and k are positive constants. Find and interpret $R'(c)$. Source: Mathematical Biology.
>
> — s. 268

Opstil funktionen $R(c)$

$$R(c) = \frac{ac^2}{1 + Bc^2} - kc$$
$$R(c) = \frac{f(x)}{g(x)} - kc$$

Opstil f og g

$$f(x) = ac^2 \Leftrightarrow f'(x) = 2ac$$
$$g(x) = 1 + Bc^2 \Leftrightarrow g'(x) = 2bc$$

Brug kvotientreglen

$$R'(c) = \frac{(2ac) * (1 + bc^2) - (ac^2) * (2bc)}{(1 + bc^2)^2} - k$$

Herefter kan tælleren reduceres

$$\begin{aligned}
&(2ac) * (1 + bc^2) - (ac^2) * (2bc) \\
&\Leftrightarrow 2ac * 2acbc^2 - (ac^2) * (2bc) \\
&\Leftrightarrow 4a^2c^4b - (ac^2) * (2bc) \\
&\Leftrightarrow 4a^2c^4b - 2abc^3 \\
&\Leftrightarrow 2ac
\end{aligned}$$

Indsæt den reducerede tæller i $R'(c)$

$$R'(c) = \frac{2ac}{(1 + bc^2)^2} - k$$