Assignment to 6.2.4.2

According to the observations of an expert for a specific product the following data are valid:

$p := 70$ Selling price

$c_v := 8$ Variable cost per unit

$C_f := 6000$ Fixed cost

$x := 0..100$ Quantity of goods produced and of goods sold

$R(x) := p\,x - c_v\,x - C_f$ Result

Normally the production per year is $x_0 := 100$ with all products being sold during the year.

Due to a damaging event, which fortunately is insured, production and sales shrink by $\Delta x := 3$ units. The insurance company has to refund the foregone profit.

Check the following calculations:

First expert

The normal quantity $x_0 = 100$ yields a profit of $R(x_0) = 200$

This gives a profit per unit of

$$r(x_0) := \frac{R(x_0)}{x_0}$$

$$r(x_0) = 2$$

Hence each product not produced (and sold, naturally) would have brought a profit of $r(x_0)$. Since Δx products could not be produced the foregone profit is

$$\Delta R(\Delta x) := r(x_0) \cdot \Delta x$$

$$\Delta R(\Delta x) = 6$$

Second expert

A second expert determines the same profit function, but he argues as follows:

Normally the profit is $R(x_0) = 200$ with a turnover of $p\,x_0 = 7000$

The share of the profit in the sales volume is $\frac{R(x_0)}{p\,x_0} = 2.8571\,\%$

Turnover has been reduced by $p \cdot \Delta x = 210$

Applying the percentage rate $\frac{R(x_0)}{p\,x_0} = 2.8571\,\%$ on this reduction in turnover yields a foregone profit of:

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$$\frac{R(x_0)}{p\,x_0} \cdot p\Delta x = 6$$

Third expert

The third expert agees to the underlying profit function, but he points out that the quantity $x_0 = 100$ is normally produced an sold in a year with $t := 200$ working days.

In other words, every working day yields a profit of $\frac{R(x_0)}{t} = 1$.

The downtime was

$$\Delta t := \Delta x \cdot \frac{t}{x_0}$$

A downtime of $\Delta t = 6$ gives a foregone profit of

$$\frac{R(x_0)}{t} \cdot \Delta t = 6$$

What is wrong with all these calculations?