7.

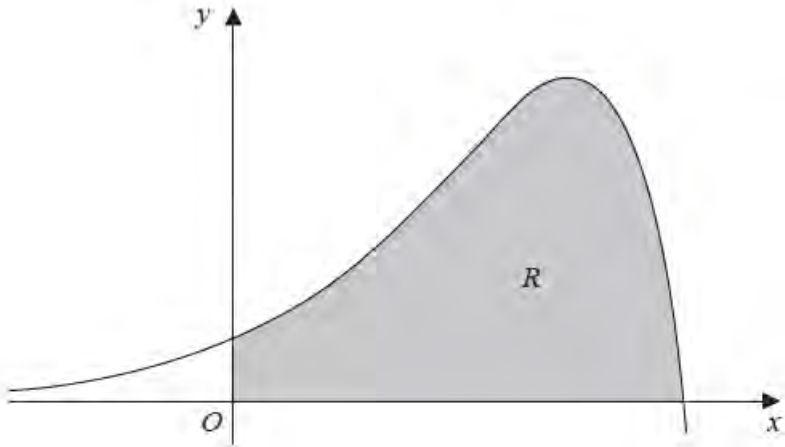

Figure 4

Figure 4 shows a sketch of part of the curve with equation

$$y = 2e^{2x} - xe^{2x}, \quad x \in \mathbb{R}.$$

The finite region R, shown shaded in Figure 4, is bounded by the curve, the x-axis and the y-axis.

Use calculus to show that the exact area of R can be written in the form $pe^4 + q$, where p and q are rational constants to be found.

(*Solutions based entirely on graphical or numerical methods are not acceptable.*)

(Total for Question 7 is 5 marks)