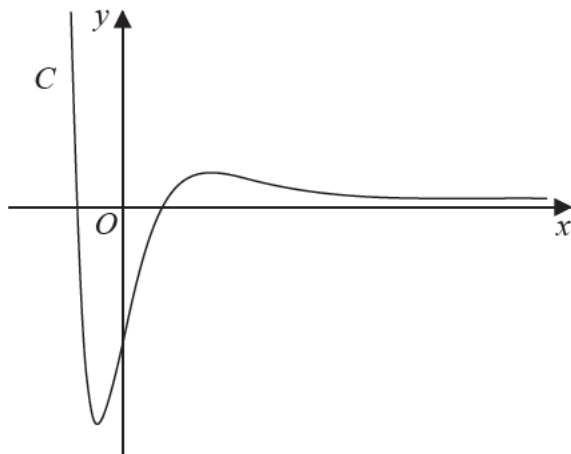**9.**

Figure 2

Figure 2 shows a sketch of the curve C with equation $y = f(x)$ where

$$f(x) = 4(x^2 - 2)e^{-2x} \qquad x \in \mathbb{R}$$

(a) Show that $f'(x) = 8(2 + x - x^2)e^{-2x}$

(3)

(b) Hence find, in simplest form, the exact coordinates of the stationary points of C.

(3)

The function g and the function h are defined by

$$g(x) = 2f(x) \qquad x \in \mathbb{R}$$

$$h(x) = 2f(x) - 3 \qquad x \geqslant 0$$

(c) Find (i) the range of g

(ii) the range of h

(3)