

## **STEP II, 2001 Q5**

- 5 The curve  $C_1$  passes through the origin in the  $x$ - $y$  plane and its gradient is given by

$$\frac{dy}{dx} = x(1 - x^2)e^{-x^2}.$$

Show that  $C_1$  has a minimum point at the origin and a maximum point at  $(1, \frac{1}{2}e^{-1})$ . Find the coordinates of the other stationary point. Give a rough sketch of  $C_1$ .

The curve  $C_2$  passes through the origin and its gradient is given by

$$\frac{dy}{dx} = x(1 - x^2)e^{-x^3}.$$

Show that  $C_2$  has a minimum point at the origin and a maximum point at  $(1, k)$ , where  $k > \frac{1}{2}e^{-1}$ . (You need not find  $k$ .)



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