Question 8 (40 marks)
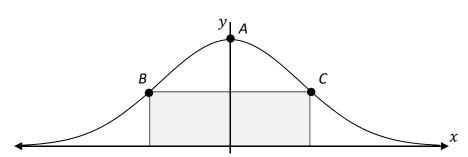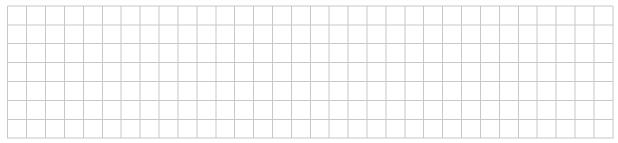
The graph of the **symmetric** function $f(x) = \dfrac{1}{\sqrt{2\pi}}e^{-\frac{1}{2}x^2}$ is shown below.

(a) Find the co-ordinates of A, the point where the graph intersects the y-axis.
Give your answer in terms of π.

(b) The co-ordinates of B are $\left(-1, \dfrac{1}{\sqrt{2\pi e}}\right)$. Find the area of the shaded rectangle in the diagram above. Give your answer correct to 3 decimal places.

(c) Use calculus to show that $f(x)$ is decreasing at C.