Question 4 (12 marks) Use the Question 4 Writing Booklet.

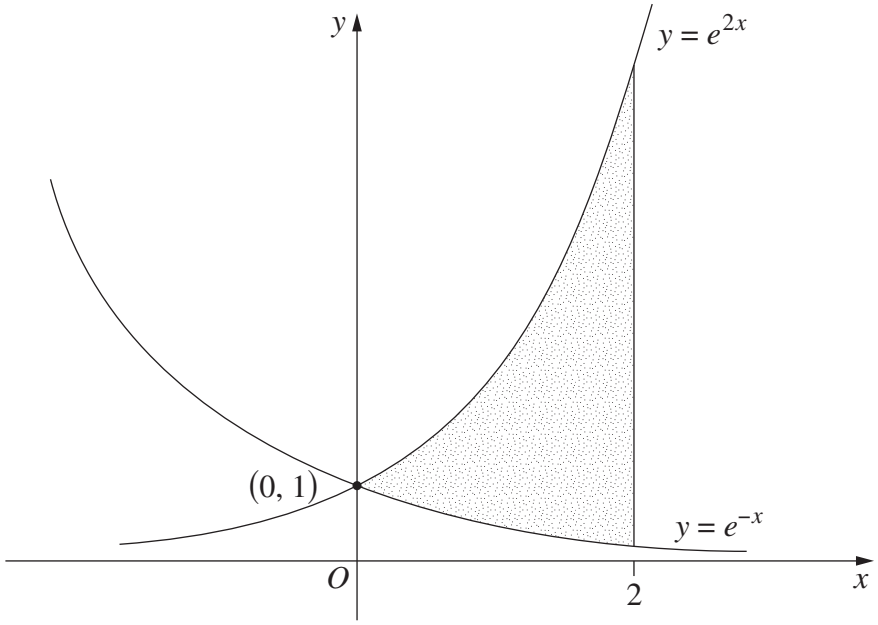
(a) Susannah is training for a fun run by running every week for 26 weeks. She runs 1 km in the first week and each week after that she runs 750 m more than the previous week, until she reaches 10 km in a week. She then continues to run 10 km each week.

(i) How far does Susannah run in the 9th week? **1**

(ii) In which week does she first run 10 km? **1**

(iii) What is the total distance that Susannah runs in 26 weeks? **2**

(b) The curves $y = e^{2x}$ and $y = e^{-x}$ intersect at the point $(0, 1)$ as shown in the diagram. **3**



Find the exact area enclosed by the curves and the line $x = 2$.

Question 4 continues on page 7

Question 4 (continued)

(c) There are twelve chocolates in a box. Four of the chocolates have mint centres, four have caramel centres and four have strawberry centres. Ali randomly selects two chocolates and eats them.

(i) What is the probability that the two chocolates have mint centres? **1**

(ii) What is the probability that the two chocolates have the same centre? **1**

(iii) What is the probability that the two chocolates have different centres? **1**

(d) Let $f(x) = 1 + e^x$. **2**

Show that $f(x) \times f(-x) = f(x) + f(-x)$.

End of Question 4