

Question 11**(9 marks)**

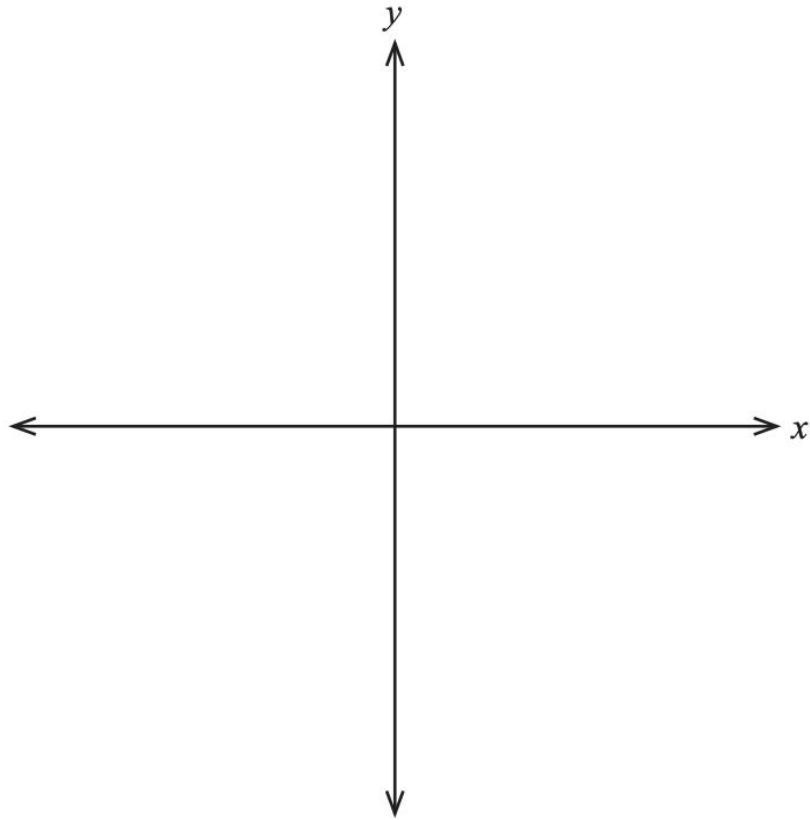
The line $y = x + c$ is tangent to the graph of $f(x) = e^x$.

(a) Obtain the coordinates of the point of intersection of the tangent with the graph of $f(x)$.
(2 marks)

(b) What is the value of c ?
(1 mark)

(c) Sketch the graph of $f(x)$ and the tangent on the axes below.

(1 mark)



- (d) Evaluate the exact area between the graph of $f(x)$, the tangent line, and the line $x = \ln 2$.
(3 marks)
- (e) Given that $g(x)$ is the inverse function of $f(x)$, write a definite integral that could be used to determine the area between the graph of $g(x)$, the x -axis, and the line $x = \ln 2$.
(2 marks)