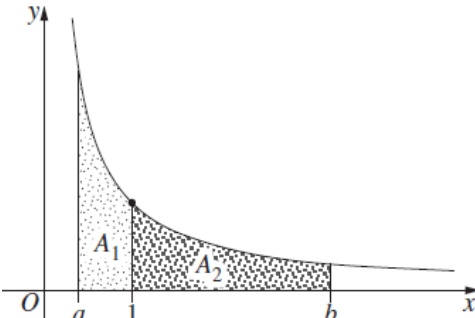*Want more revision exercises?* Get **MathsFit** *- New from projectmaths.*

| 10 | 5c | The diagram shows the curve $y = \dfrac{1}{x}$, for $x > 0$.
The area under the curve between $x = a$ and $x = 1$ is A_1. The area under the curve between $x = 1$ and $x = b$ is A_2.
The area A_1 and A_2 are each equal to 1 square unit.
Find the values of a and b. | | 3 |

State Mean:
1.77/3

$$A_1 = \int_a^1 \frac{1}{x}\, dx = 1$$

$$\therefore \left[\log_e x\right]_a^1 = 1$$
$$\log_e 1 - \log_e a = 1$$
$$0 - \log_e a = 1$$
$$\log_e a = -1$$
$$e^{\log a} = e^{-1}$$
$$a = \frac{1}{e}$$

$$A_2 = \int_1^b \frac{1}{x}\, dx = 1$$

$$\therefore \left[\log_e x\right]_1^b = 1$$
$$\log_e b - \log_e 1 = 1$$
$$\log_e b - 0 = 1$$
$$\log_e b = 1$$
$$e^{\log b} = e^1$$
$$b = e$$

$$\therefore a = \frac{1}{e} \text{ and } b = e.$$

* These solutions have been provided by *projectmaths* and are not supplied or endorsed by the Board of Studies

Board of Studies: Notes from the Marking Centre

This part was generally well done with many candidates able to earn at least one mark. A common error, however, was to state that the sum of the areas was 1 and not the correct value of 2. It was noticeable that a number of candidates were unable to solve the log equations by simply writing the expressions in exponential form and therefore missed an easy third mark.

Source: http://www.boardofstudies.nsw.edu.au/hsc_exams/