Exam Question
Topic: Double Integral
The region R is a trapezium bounded by the lines $x = \frac{1}{2}, x = 1.y = x, y = 2x$. Evaluate the double integral

$$\iint_R \frac{\sin x}{x}\, d(x, y).$$

Give your answer in exact form and also as an approximation rounded to four decimal places using your calculator.

Solution
To evaluate the double integral we integrate with respect to y first, giving:

$$\int_{x=1/2}^{1} dx \int_{y=x}^{2x} \frac{\sin x}{y}\, dy = \int_{x=1/2}^{1} \left[\frac{y \sin x}{x}\right]_{y=x}^{2x} dx$$

$$= \int_{x=1/2}^{1} \sin x\, dx = \cos(1/2) - \cos(1) = 0.3373 \quad (4 \text{ d.p.})$$