



Integration

Maths Past Exam Questions

Marking Schemes

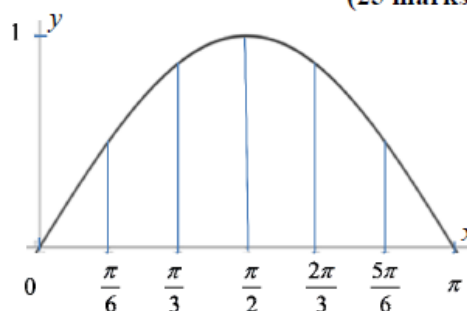
Higher Level

Paper One- Project Maths - Section A – Q6

Question 6

The diagram shows the graph of the function $y = \sin x$ in the domain $0 \leq x \leq \pi$, $x \in \mathbb{R}$.

(25 marks)



x	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	π
y	0	0.5	0.866	1	0.866	0.5	0

- (b) Use the trapezoidal rule to find the approximate area of the region enclosed between the curve and the x -axis in the given domain.

$$\begin{aligned}
 A &= \frac{h}{2} [y_1 + y_n + 2(y_2 + y_3 + y_4 + \dots + y_{n-1})] \\
 &= \frac{\pi}{12} [0 + 0 + 2(0.5 + 0.866 + 1 + 0.866 + 0.5)] \\
 &= 1.95407
 \end{aligned}$$

- (c) Use integration to find the actual area of the region shown above.

$$\int_0^{\pi} \sin x dx = [-\cos x]_0^{\pi} = -[-1 - 1] = 2$$

- (d) Find the percentage error in your answer to (a) above.

$$\text{Percentage error} = \frac{2 - 1.95407}{2} \times 100 = 2.2965 = 2.3\%$$