A typical Problem Asked in the Exam

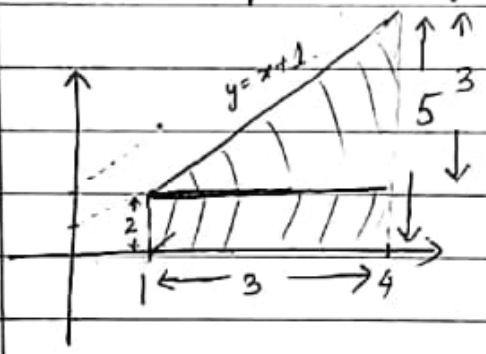
Let A be the area in the xy-plane bounded by the x-axis and the lines $y = x+1$, $x = 1$, $x = 4$.

Determine A by

(i) using geometry

(ii) with a definite integral.

Soln:



This is the graph

(i) Area of triangle $= \frac{1}{2} \cdot 3 \cdot 3 = \frac{9}{2}$.

Area of rectangle $= 2 \cdot 3 = 6$.

Total area $A = \frac{9}{2} + 6 = \frac{21}{2} = 10.5$

(ii) $$\int_1^4 (x+1)\,dx = \int_1^4 x\,dx + \int_1^4 dx$$

$$= \frac{x^2}{2}\Big|_1^4 + x\Big|_1^4$$

$$= \left(\frac{16}{2} - \frac{1}{2}\right) + (4-1) = 8 - \frac{1}{2} + 3 = 11 - \frac{1}{2}$$

$$= 10.5.$$

Thus, they match!

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