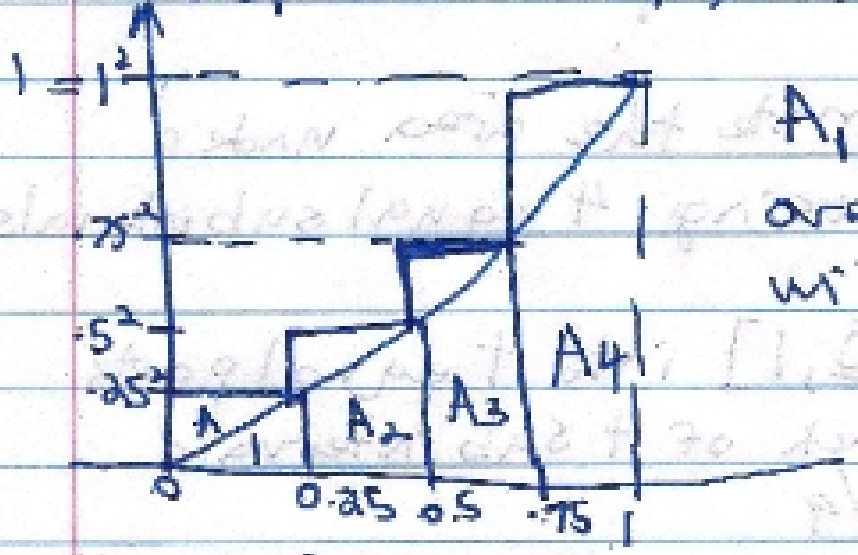
Problem II: Approximate the area under $y = x^2$ from 0 to 1 using 4 equal subintervals with the right endpoints

Solution: Divide $[0,1]$ into 4 equal parts $\Delta x = \frac{1-0}{4} = \frac{1}{4} = 0.25$

We have 4 equal subintervals of $[0,1]$ with $\Delta x = 0.25$
$[0, 0.25]$, $[0.25, 0.5]$, $[0.5, 0.75]$, $[0.75, 1]$
with corresponding right endpoints
0.25, 0.5, 0.75, 1, respectively



A_1, A_2, A_3, A_4 are the areas of 4 rectangles with the right end points

$A_y = x^2 \approx \underbrace{0.25 \cdot 0.25^2}_{A_1} + \underbrace{0.25 \cdot 0.5^2}_{A_2} + \underbrace{0.25 \cdot 0.75^2}_{A_3}$

the area below $y = x^2$ on $[0,1]$ $+ \underbrace{0.25 \cdot 1}_{A_4} \approx 0.25\,(0.25^2 + 0.5^2 + 0.75^2 + 1) \approx \boxed{0.469 \text{ units}^2}$

Problem III: Same as problem 2, but with mid points

Definition: The midpoint of $[a,b]$ is $x = \frac{a+b}{2}$