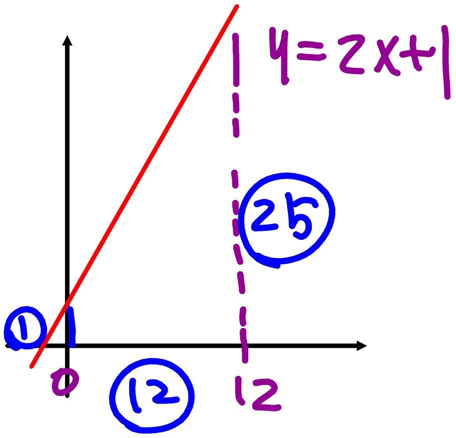


Area under $y=2x+1$

$$A=\frac{(1+25)12}{2}$$

$$=\boxed{156}$$

n	area
3	108
4	120
6	132
12	144
n	$\frac{12}{n}\left[f(0)+f\left(\frac{12}{n}\right)+f\left(2\left(\frac{12}{n}\right)\right)+f\left(3\left(\frac{12}{n}\right)\right)+f\left(4\left(\frac{12}{n}\right)\right)+\dots\right]$

$$\frac{12}{n}\left(\boxed{2\left(0\cdot\frac{12}{n}\right)}+1+\boxed{2\left(1\cdot\frac{12}{n}\right)}+1+\boxed{2\left(2\cdot\frac{12}{n}\right)}+1+\dots\right)$$

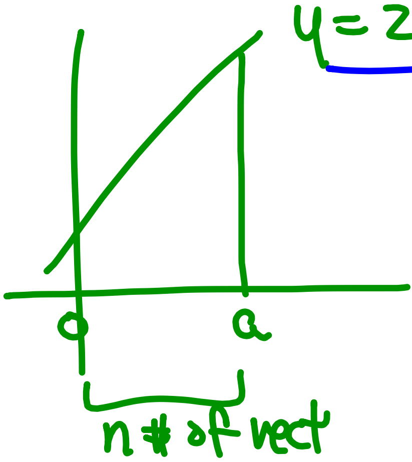
n^{th} term

$$2\left((n-1)\frac{12}{n}\right)$$

$$\frac{12}{n}\left(\frac{\left(0+(n-1)\frac{12}{n}\right)n}{2}+n\right)$$

$$\frac{12}{n}\left(\frac{12n-12}{2}+n\right)=\frac{12}{n}(6n-6+n)$$

$$=\frac{12}{n}(7n-6)$$



$y = 2x + 1$

$$\frac{a}{n}\left[\begin{array}{l} 0+1 \\ +2\frac{a}{n}+1 \\ +2\left(\frac{2a}{n}\right)+1 \\ +2\left(\frac{3a}{n}\right)+1 \\ \vdots \\ +2\left(\frac{(n-1)a}{n}\right)+1 \end{array}\right]$$

$$= \frac{a}{\cancel{n}}\left[\frac{\left(1 + 2\frac{(n-1)a}{n} + 1\right)\cancel{n}}{2}\right]$$

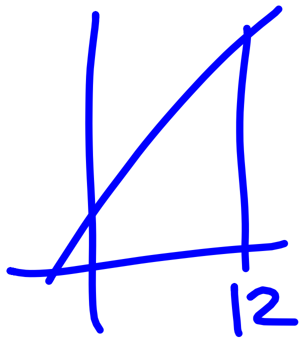
$$= a\left(\frac{\cancel{2} + \cancel{2}\frac{a(n-1)}{n}}{\cancel{2}}\right) = \frac{a^2(n-1)}{n}$$

$$= \frac{a^2 n - a^2}{n} + a$$

$$= a^2 - \frac{a^2}{n} + a$$

as $n \to \infty$

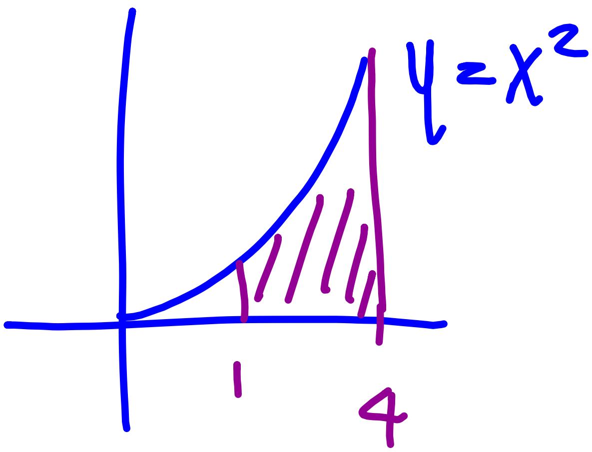
$$= a^2 + a \rightarrow \underline{x^2 + x}$$



$\int_0^{12} 2x+1\,dx$ = Area under $y = 2x+1$

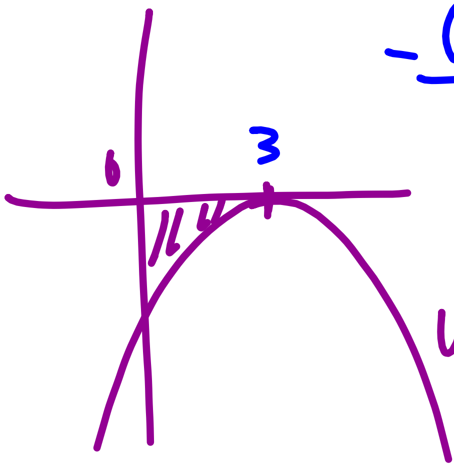
$x^2+x\Big]_0^{12} = (12^2+(12)) - (0^2+0)$

$= 156$



$$\int_1^4 x^2\,dx = \frac{x^3}{3}\Big]_1^4$$

$$= \frac{4^3}{3} - \frac{1^3}{3} = \frac{63}{3} = 21$$



$$-\frac{(x-3)^3}{3}\Big]_0^3 = \int_0^3 -(x-3)^2\,dx$$

$$y = -(x-3)^2$$

$$u = x-3$$

$$du = dx$$

$$-\int u^2\,du = -\frac{u^3}{3}$$