$$\sum_{k=1}^{n} k^2 = \frac{n(n+1)(2n+1)}{6} = \frac{n(2n^2+3n+1)}{6} = \frac{2n^3+3n^2+n}{6}$$

$$= \boxed{\frac{n^3}{3} + \frac{n^2}{2} + \frac{n}{6}} = \frac{n^3 + \text{less degree}}{3}$$

$$\int_0^2 x^2\,dx \quad . \quad \Delta x = \frac{b-a}{n} = \frac{2-0}{n} = \frac{2}{n}$$

$$x_k = a + k\Delta x = 0 + k\cdot\frac{2}{n} = \frac{2}{n}k$$

$$\text{Area} \approx \sum_{k=1}^{n} f(x_k)\Delta x = \sum_{k=1}^{n} x_k^2\,\Delta x = \sum_{k=1}^{n}\left(\frac{2}{n}k\right)^2\cdot\frac{2}{n} = \frac{2}{n}\sum_{k=1}^{n}\frac{4k^2}{n^2}$$

$$= \frac{8}{n^3}\sum_{k=1}^{n} k^2 = \frac{8}{n^3}\left[\frac{n^3}{3} + \frac{n^2}{2} + \frac{n}{6}\right]$$

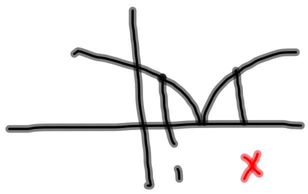
$$= \frac{8n^3}{3n^3} + \boxed{\frac{8n^2}{2n^3} + \frac{8n}{6n^3}} \xrightarrow{n\to\infty} \frac{8}{3} + 0 + 0$$

$\to 0$ as $n \to \infty$

$$\int_a^b f(x)\,dx \qquad 25^{\frac{3}{2}} = 5^3 = 125$$

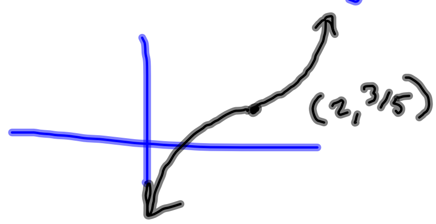
$$\int_1^x f(t)\,dt = \int_1^x t\,dt = -\int_x^1 t\,dt$$

$$f(x) = (x-2)^{\frac{2}{3}} \qquad \int_1^x (x-2)^{\frac{2}{3}}\,dx = \frac{3}{5}(x-2)^{\frac{5}{3}}\Big]_1^x$$



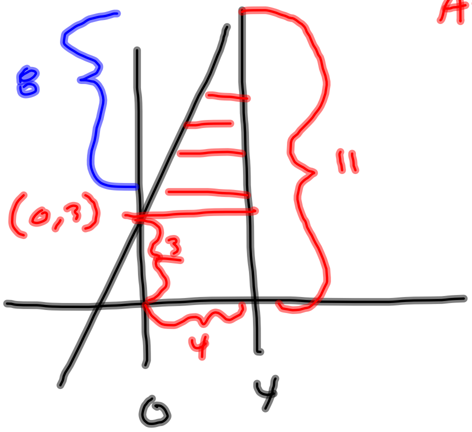
$$= \frac{3}{5}(x-2)^{\frac{5}{3}} - \frac{3}{5}(-1)^{\frac{5}{3}}$$

$$= \frac{3}{5}(x-2)^{\frac{5}{3}} + \frac{3}{5}$$



$$\int_0^4 (2x+3)\,dx = \frac{1}{2}\left[\frac{(2x+3)^2}{2}\right]_0^4 = \frac{1}{4}\left[121-9\right] = \frac{112}{4}$$

$$= 28$$



$$A = \frac{1}{2}(B_1+B_2)h$$

$$= \frac{1}{2}(11+3)4 = 28$$

$$\triangle + \square$$

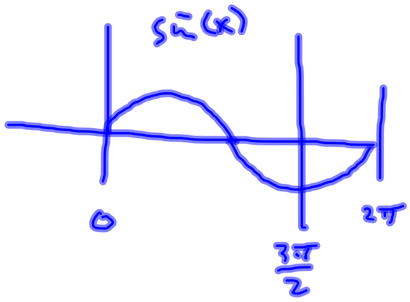
$$= \frac{1}{2}bh + lw$$

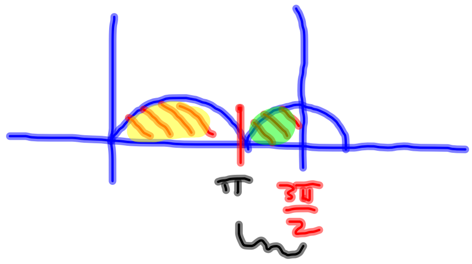
$$= \frac{1}{2}(4)(8) + 4(3)$$

$$= 16+12 = 28$$

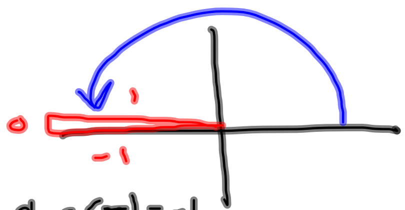
$$= \int_0^4 (2x+3)\,dx = \left[x^2+3x\right]_0^4 = 16+12 = 28$$

$$\int_0^{\frac{3\pi}{2}} |\sin(x)|\,dx = \int_0^{\pi} \sin(x)\,dx + \int_{\pi}^{\frac{3\pi}{2}} -\sin(x)\,dx$$



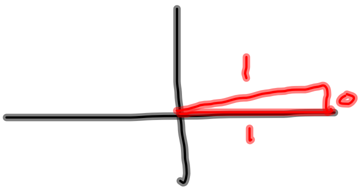


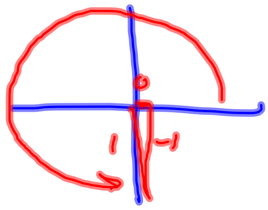
$$= -\cos(x)\Big]_0^{\pi} + \cos(x)\Big]_{\pi}^{\frac{3\pi}{2}} = -\cos(\pi) - (-\cos(0)) +$$
$$\cos\left(\tfrac{3\pi}{2}\right) - \cos(\pi)$$



$\cos(\pi) = -1$

$$= -(-1) - (-1) + 0 - (-1) = 3$$





$$\boxed{G(x) = \int_1^x \sin^2(\pi t)\,dt}$$

$$\frac{d}{dx}\int_1^{\sin x} (t^2 - 7t)\,dt$$

$$= \left((\sin(x))^2 - 7\sin(x)\right)\cos x$$

$$\frac{dG}{dx} = \sin^2(\pi x)$$

$$G(x^2+5) = \int_1^{x^2+5} \sin^2(\pi t)\,dt = \int_1^{u} \sin^2(\pi t)\,dt = G(u)$$

$$\frac{dG}{dx} = \frac{dG}{du}\cdot\frac{du}{dx} = \sin^2(\pi u)\cdot 2x = \sin^2(\pi(x^2+5))\cdot 2x$$

$$\int_2^5 x^2\,dx$$

$$\Delta x = \frac{b-a}{n} = \frac{5-2}{n} = \frac{3}{n}$$

$$x_k = a + k\Delta x = 2 + k\cdot\frac{3}{n} = 2 + \frac{3k}{n}$$

$$\text{Area} \approx \sum_{k=1}^{n} f(x_k)\Delta x = \Delta x \sum_{k=1}^{n} f(x_k) = \frac{3}{n}\sum_{k=1}^{n} f\left(2+\frac{3k}{n}\right)$$

$$= \frac{3}{n}\sum_{k=1}^{n}\left(2+\frac{3k}{n}\right)^2 = \frac{3}{n}\sum_{k=1}^{n}\left(4+\frac{12k}{n}+\frac{9k^2}{n^2}\right)$$

$$\left(2+\frac{3k}{n}\right)^2 = \left(2+\frac{3k}{n}\right)\left(2+\frac{3k}{n}\right) = 4 + \frac{6k}{n} + \frac{6k}{n} + \frac{9k^2}{n^2}$$

$$= 4 + \frac{12k}{n} + \frac{9k^2}{n^2}$$

$$(a+b)^2 = a^2 + 2ab + b^2$$

$$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$$