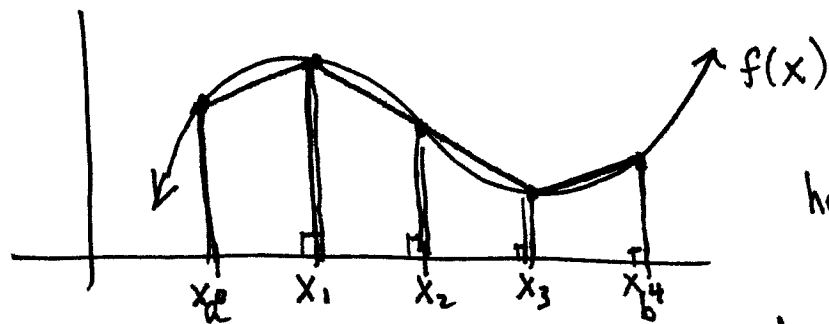


Trapezoid Rule — uses trapezoids to estimate the area under a curve



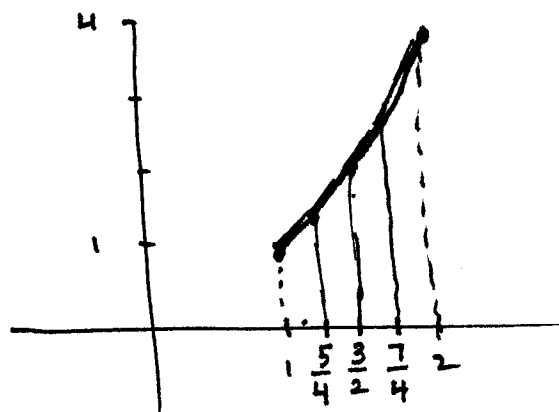
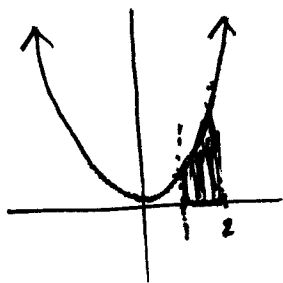
$$\text{height} = \frac{b-a}{n}$$

$$A = \frac{1}{2} \left(\frac{b-a}{n} \right) [f(x_0) + f(x_1) + f(x_1) + f(x_2) + f(x_2) + f(x_3) + f(x_3) + f(x_4)]$$

$$A = \frac{1}{2} \left(\frac{b-a}{n} \right) [f(x_0) + 2f(x_1) + 2f(x_2) + 2f(x_3) + f(x_4)]$$

$$\frac{b-a}{2n}$$

EX1 Estimate $\int_1^2 x^2 dx$ using 4 trapezoids.



$$h = \frac{2-1}{4} = \frac{1}{4}$$

actual:

$$\left. \frac{1}{3}x^3 + C \right|_1^2$$

$$\frac{8}{3} - \frac{1}{3}$$

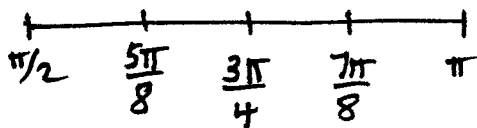
$$\frac{7}{3}$$

$$A = \frac{2-1}{2(4)} [1 + 2\left(\frac{25}{16}\right) + 2\left(\frac{9}{4}\right) + 2\left(\frac{49}{16}\right) + 4]$$

$$= \boxed{2.34375}$$

EX2 $f(x) = \sqrt{x} \sin x$ $[\frac{\pi}{2}, \pi]$ $n = 4$

$$h = \frac{\pi - \frac{\pi}{2}}{4} = \frac{\pi}{8}$$



$$A = \frac{1}{2} \left(\frac{\pi}{8} \right) \left[\sqrt{\frac{\pi}{2}} \sin \frac{\pi}{2} + 2\sqrt{\frac{5\pi}{8}} \sin \frac{5\pi}{8} + 2\sqrt{\frac{3\pi}{4}} \sin \frac{3\pi}{4} + 2\sqrt{\frac{7\pi}{8}} \sin \frac{7\pi}{8} + \sqrt{\pi} \sin \pi \right]$$

$$= 1.430$$

EX3

x	2	5	7	8
$f(x)$	10	30	40	20

3
2
1

f is cont on $[2, 8]$. Use a trap. approx. with 3 subintervals to find $\int_2^8 f(x) dx$.

$$\frac{1}{2}(3)(10+30) + \frac{1}{2}(2)(30+40) + \frac{1}{2}(1)(40+20)$$

$$60 + 70 + 30$$

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