

HW 22 #10

$$f'''(x) = -\cos(x) + \sin(x)$$

$$f(0) = 1, f(\pi) = 0$$

$$f''(x) = -\sin(x) - \cos(x) + C$$

$$f(x) = \cos(x) - \sin(x) + Cx + D$$

$$f(x) = \cos(x) - \sin(x) + \frac{1}{\pi}x$$

$$f(0) = 1 = \cos(0) - \sin(0) + C(0) + D$$

$$1 = 1 + D \rightarrow D = 0$$

$$f(\pi) = 0 = \cos(\pi) - \sin(\pi) + C\pi$$

$$0 = -1 + C\pi \rightarrow C\pi = 1 \rightarrow$$

$$C = \frac{1}{\pi}$$

HW 22 #5

$$f(x) = x^2 (\sqrt[3]{x}) - 4 \cot(x) \csc(x)$$

$$\underbrace{x^2 \cdot x^{1/3}}$$

$$\underbrace{x^{6/3} \cdot x^{1/3}} = x^{7/3}$$

$$f(x) = x^{7/3} - 4 \cot(x) \csc(x)$$

$$F(x) = \frac{3}{10} x^{10/3} + 4 \csc(x) + C$$

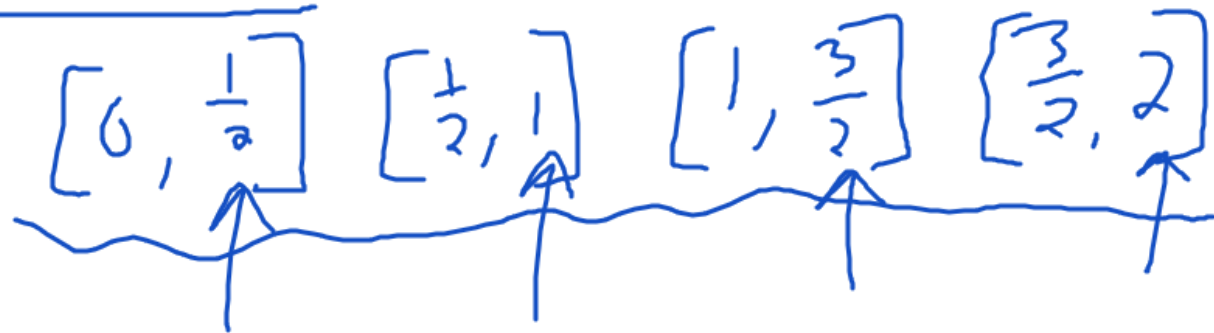
HW 23 #1

$f(x) = x^2 + 1$

$[0, 2]$   $n = 4$

$\Delta x = \frac{2-0}{4} = \frac{1}{2}$

Left endpoints



$\vec{A} = [f(0) + f(\frac{1}{2}) + f(1) + f(\frac{3}{2})] \Delta x = \frac{15}{4}$

$A = [1 + \frac{5}{4} + 2 + \frac{13}{4}] (\frac{1}{2})$   
 $\rightarrow [\frac{4}{4} + \frac{5}{4} + \frac{8}{4} + \frac{13}{4}] (\frac{1}{2})$

Right endpoints

$$\begin{aligned} A &= \left[ f\left(\frac{1}{2}\right) + f(1) + f\left(\frac{3}{2}\right) + f(2) \right] \Delta x \\ &= \left[ \frac{5}{4} + \frac{8}{4} + \frac{13}{4} + \frac{26}{4} \right] \left(\frac{1}{2}\right) \\ &= \left(\frac{46}{4}\right) \cdot \left(\frac{1}{2}\right) = \boxed{\frac{23}{4}} \end{aligned}$$

$$f(x) = x^2 + 1$$

Midpoints

$$\left[0, \frac{1}{2}\right]$$
$$\frac{\frac{1}{2} + 0}{2}$$

$$\left[\frac{1}{2}, 1\right]$$
$$\frac{1 + \frac{1}{2}}{2}$$

$$\left[1, \frac{3}{2}\right]$$
$$\frac{1 + \frac{3}{2}}{2}$$

$$\left[\frac{3}{2}, 2\right]$$
$$\frac{\frac{3}{2} + 2}{2}$$

$$x^2 + 1$$

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

$$\left[ \frac{17}{16} + \frac{25}{16} + \frac{41}{16} + \frac{65}{16} \right] \left(\frac{1}{2}\right) = \frac{148}{16} \cdot \frac{1}{2} = \frac{74}{16} = \frac{37}{8}$$

HW 24 #16

$-2 \leq f(x) \leq 5$  on  $[-1, 3]$

$\uparrow \downarrow \int_{-1}^3 f(x) dx$

$\textcircled{-8} \neq \int_{-1}^3 f(x) dx \leq \textcircled{20}$

$\int_{-1}^3 -2 dx$   $\leq \int_{-1}^3 f(x) dx \leq \int_{-1}^3 5 dx$

$5x \Big|_{-1}^3$   
 $5(3) - 5(-1) = 15 + 5 = 20$

