

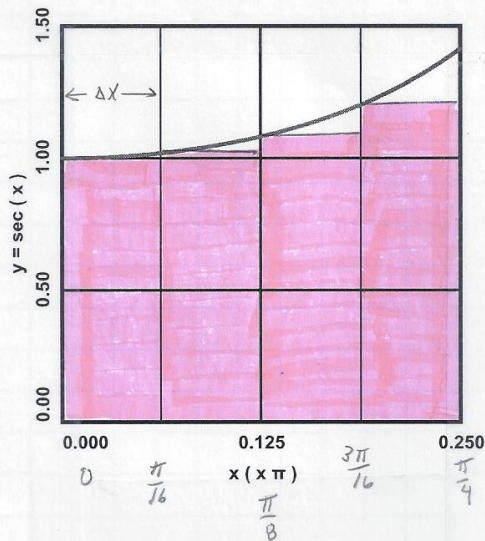
Quiz #9 Study Guide

1 of 3

(1) $f(x) = \sec x$ on $x \in [0, \frac{\pi}{4}]$.

$$\text{Exact} = \int_0^{\pi/4} \sec x \, dx = \left[\ln |\sec x + \tan x| \right]_0^{\pi/4} = \ln(\sqrt{2} + 1) = 0.881373587 \leftarrow$$

(a) LRAM



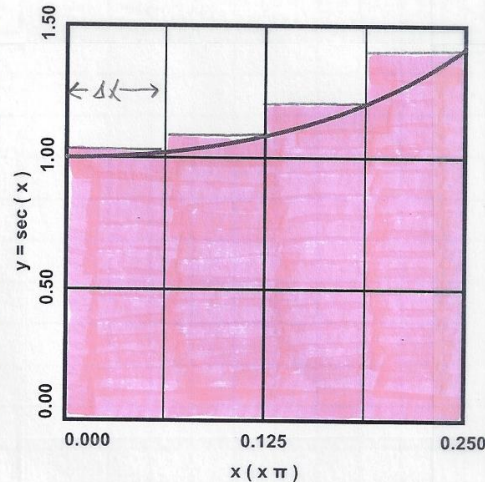
$$\Delta x = \frac{\pi}{16} \equiv \text{16 division size}$$

$$\text{est.} \approx \left[f(0) + f\left(\frac{\pi}{16}\right) + f\left(\frac{\pi}{8}\right) + f\left(\frac{3\pi}{16}\right) \right] \Delta x =$$

$$= 0.845220593 \leftarrow$$

$$\text{error} = -4.10\% \leftarrow$$

(b) RRAM



$$\text{est.} \approx \left[f\left(\frac{\pi}{16}\right) + f\left(\frac{\pi}{8}\right) + f\left(\frac{3\pi}{16}\right) + f\left(\frac{\pi}{4}\right) \right] \Delta x$$

$$= 0.9265512358 \leftarrow$$

$$\text{error} = 5.13\% \leftarrow$$

(2) MRAM = 0.8813734416 \leftarrow

$$\text{error} = -0.000165\% \leftarrow$$

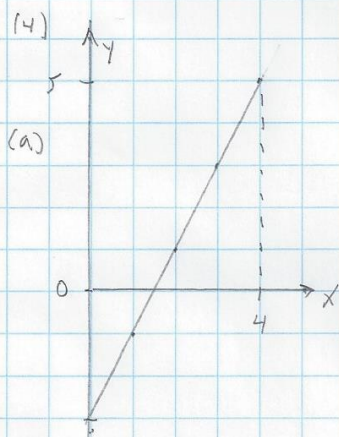
(3) $\int_7^{17} f(x) \, dx = 42$, $\int_7^{11} f(x) \, dx = 27$, $\int_{11}^{17} g(x) \, dx = 19$

(a) $\int_7^{17} f(x) \, dx = \int_7^{11} f(x) \, dx + \int_{11}^{17} f(x) \, dx$, $42 = 27 + \int_{11}^{17} f(x) \, dx$,
 $\int_{11}^{17} f(x) \, dx = 15 \leftarrow$

Quiz #9 Study Guide

20F3

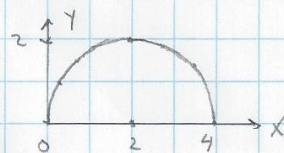
$$(b) \int_{11}^{17} [3g(x) - 2f(x)] dx = 3 \int_{11}^{17} g(x) dx - 2 \int_{11}^{17} f(x) dx = 3(19) - 2(15) = 27 \leftarrow$$



$$\int_0^4 (2x-3) dx = -\frac{1}{2} b_1 h_1 + \frac{1}{2} b_2 h_2 = -\frac{1}{2} (1.5)(3) + \frac{1}{2} (2.5)(5) = 4 \leftarrow$$

(b) Circle: $(x-2)^2 + y^2 = 2^2 = 4$ $y^2 = 4 - (x-2)^2$
 $y = \sqrt{4 - (x-2)^2}$

$$\int_0^4 \sqrt{4 - (x-2)^2} dx = \frac{1}{2} \pi r^2 = \frac{1}{2} \pi (2)^2 = 2\pi \leftarrow$$



(r) (a) $\int (9x^2 - 6x + 4) dx = 9 \cdot \frac{x^3}{3} - 6 \cdot \frac{x^2}{2} + 4x + k = 3x^3 - 3x^2 + 4x + k = F(x) + k \leftarrow$

(b) $3x^{-1/4} + 5x^{2/3} \Rightarrow \frac{3 \cdot x^{3/4}}{3/4} + \frac{5 \cdot x^{5/3}}{5/3} = 4x^{3/4} + 3x^{5/3}$

$$\int \left(\frac{3}{4\sqrt[4]{x}} + 5 \cdot 3\sqrt{x^2} \right) dx = 4 \cdot 4\sqrt[4]{x^3} + 3 \cdot 3\sqrt{x^5} + k = G(x) + k \leftarrow$$

(6)

(a) $\int_3^7 (9x^2 - 6x + 4) dx = [F(x)]_3^7 = 844 \leftarrow$

(b) $\int_3^7 \left(\frac{3}{4\sqrt[4]{x}} + 5 \cdot 3\sqrt{x^2} \right) dx = [G(x)]_3^7 = 66.22070556$

(7) $\int F(x) dx = \frac{1}{2} [\sec x \tan x + \ln |\sec x + \tan x|] + k$ $\tan^2 x + 1 = \sec^2 x$

(a) $F(x) = \frac{d}{dx} \frac{1}{2} [\sec x \tan x + \ln |\sec x + \tan x|] =$

$$= \frac{1}{2} [\sec x \tan x + \tan x + \sec x \sec^2 x + \frac{1}{(\sec x + \tan x)} \cdot (\sec x \tan x + \sec^2 x)] =$$

Quiz #9 Study Guide

30F3

$$\begin{aligned} &= \frac{1}{2} \sec x \left[\tan^2 x + \sec^2 x + \frac{\tan x + \sec x}{\sec x + \tan x} \right] = \frac{1}{2} \sec x [\tan^2 x + \sec^2 x + 1] = \\ &= \frac{1}{2} \sec x [\sec^2 x + \sec^2 x] = \frac{1}{2} \sec x \cdot 2 \sec^2 x = \sec^3 x \quad \checkmark \end{aligned}$$

$$\begin{aligned} (b) \int_0^{\pi/4} f(x) dx &= \int_0^{\pi/4} \sec^3 x dx = \left[\frac{1}{2} (\sec x \tan x + \ln |\sec x + \tan x|) \right]_0^{\pi/4} = \\ &= \frac{1}{2} [\sqrt{2} + \ln(\sqrt{2} + 1)] = 1.147793575 \quad \checkmark \end{aligned}$$

$$(g) \frac{d}{dx} \int_{a(x)}^{b(x)} f(t) dt = f(b) \frac{db}{dx} + f(a) \frac{da}{dx}$$

$$(a) \frac{d}{dx} \int_{13}^x \cos(47t) dt = \cos(47x) \quad \checkmark$$

$$\begin{aligned} (b) \frac{d}{dx} \int_{x^4}^{x^6} t^{14} dt &= (x^6)^{14} \cdot 6x^5 - (x^4)^{14} \cdot 4x^3 = 6x^5 \cdot x^{94} - 4x^3 \cdot x^{94} = \\ &= 6x^{99} - 4x^{97} \quad \checkmark \end{aligned}$$