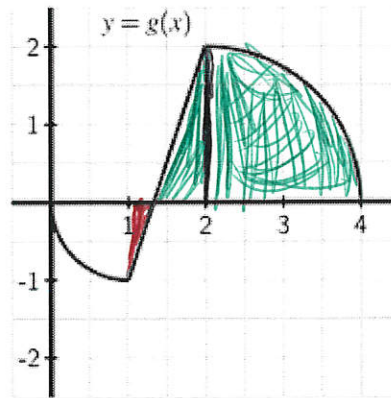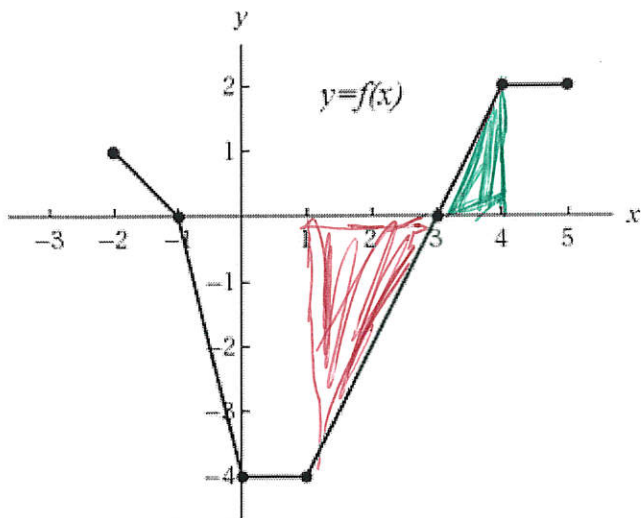You may complete your work on paper and submit it instead of typing out your answer.

Consider the graphs of two functions f and g that are provided. Each piece of f and g is either part of a straight line or part of a circl

Determine the exact value of $\int_0^1 [f(x) + g(x)]dx$

Determine the exact value of $\int_1^4 [2f(x) - 3g(x)]dx$

Determine the exact average value of $h(x) = f(x) - g(x)$

Determine the exact average value of $\int_4^0 [f(x) - g(x)]dx$

(a) $-4(1) + \dfrac{-\pi}{4} \Rightarrow -4 - \dfrac{\pi}{4}$

(b) $2\int_1^4 f(x)dy = 2\left[\dfrac{1}{2}(2)(-4) + \dfrac{1}{2}(1)(2)\right]$

$2[-4 + 1] \Rightarrow \boxed{-6}$

$-3\int_1^4 g(x)dy = -3\left(-\dfrac{1}{2} + \dfrac{1}{2}\left(\dfrac{3}{2}\right)(2) + \pi\right)$
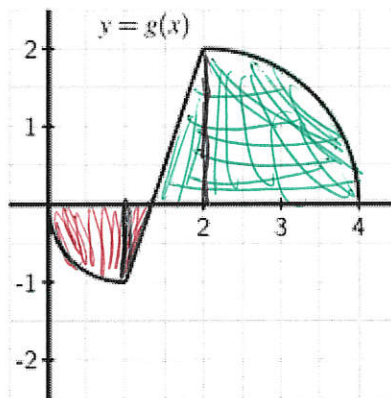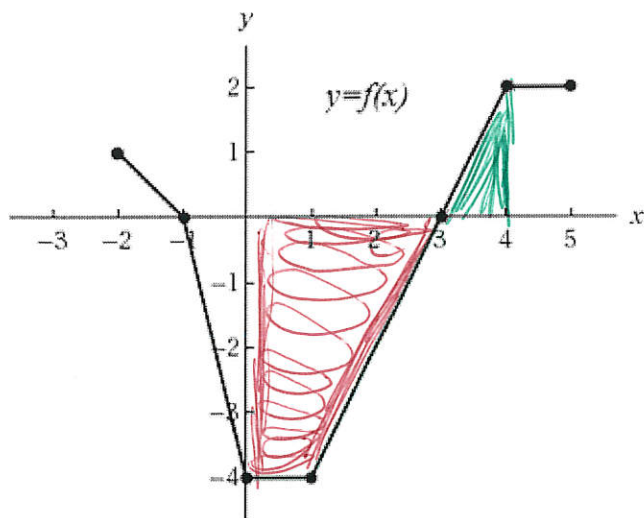
$-\dfrac{1}{2} + \dfrac{3}{2} + \pi$

$-3(1 + \pi) \Rightarrow \boxed{-3 - 3\pi}$

$-6 + -3 - 3\pi \Rightarrow \boxed{-9 - 3\pi}$

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$$\text{(d)} -\frac{1}{4} \int_0^4 f(x) - g(x) \, dx$$

$$\int_0^4 f(x) \, dx = \frac{1}{2}(3+1)(-4) + \frac{1}{2}(1)(2)$$

$$\frac{1}{2}(4)(-4) + 1$$

$$-8 + 1 = \boxed{-7}$$

$$-\int_0^4 g(x) \, dx \qquad -\left[-\frac{\pi}{4} + -\frac{1}{4} + \frac{1}{2}(3)(2) + \pi\right]$$

$$-\frac{\pi}{4} - \frac{1}{4} + \frac{3}{2} + \pi$$

$$\boxed{1 + \frac{3\pi}{4}}$$

e.

$$-\frac{1}{4}\left(-7 - 1 - \frac{3\pi}{4}\right)$$

$$-\frac{1}{4}\left(-8 - \frac{3\pi}{4}\right) = \boxed{2 + \frac{3\pi}{16}}$$