Bellwork 1/9

Let $\int_0^3 [4f(x) + 2]dx = 18$ and $\int_3^6 f(x)dx = -1$.

Find:

1. $\int_0^3 f(x)dx$
2. $\int_6^0 f(x)dx$

: : reset

Bellwork 1/9 - Solution, Part 1

$$\int_0^3 [4f(x) + 2]dx = 18$$

$$4\int_0^3 f(x)dx + 2\int_0^3 dx = 18$$

$$4\int_0^3 f(x)dx + 6 = 18$$

$$\implies \boxed{\int_0^3 f(x)dx = 3}$$

Bellwork 1/9 - Solution, Part 2

$$\int_6^0 f(x)dx = -\int_0^6 f(x)dx$$
$$= -\left[\int_0^3 f(x)dx + \int_3^6 f(x)dx\right]$$

$$\int_0^3 f(x)dx = 3; \ \int_3^6 f(x)dx = -1$$
$$\implies \boxed{\int_6^0 f(x)dx = -3 + 1 = -2}$$

Exercise 1

$$f(x) = \int_1^x \ln(1+t^2)dt$$

Find $f'(x)$ using part 1 of the FTC.

Exercise 1 - Solution

$$f(x) = \int_1^x \ln(1+t^2)dt$$

$$\implies f'(x) = \frac{\mathrm{d}}{\mathrm{d}x}\int_1^x \ln(1+t^2)dt$$

$$\text{FTC 1} \implies \boxed{f'(x) = \ln(1+x^2)}$$

Exercise 2

$$h(t) = \int_2^t \frac{s}{s^4+1} ds$$

Find $h'(t)$ using part 1 of the FTC.

Exercise 2 - Solution

$$h(t) = \int_2^t \frac{s}{s^4+1} ds$$

$$\implies h'(t) = \frac{\mathrm{d}}{\mathrm{d}t} \int_2^t \frac{s}{s^4+1} ds$$

$$\text{FTC 1} \implies \boxed{h'(t) = \frac{t}{t^4+1}}$$