

Definite Integrals (again)

A problem using the basic properties:

$$\int_2^6 f(x) dx = 10 \quad \int_2^6 g(x) dx = -2$$

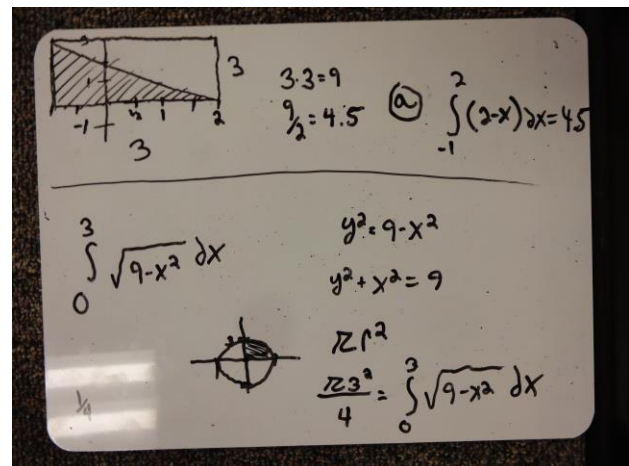
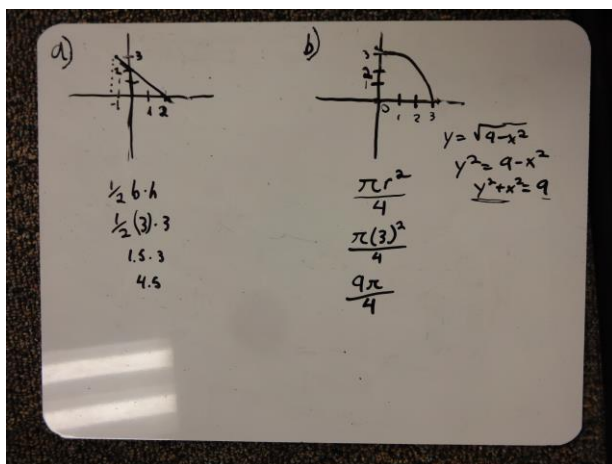
(a)
$$\int_2^6 f(x) dx - \int_2^6 g(x) dx = 12$$

$$10 - (-2) = 12$$

(b)
$$3 \left[\int_2^6 f(x) dx \right] + \int_2^6 g(x) dx = 28$$

$$3(10) + (-2) = 28$$

Recognizing that some definite integrals represent areas of well-known geometric figures.....
 Notice that $x^2 + y^2 = 9$ represents a circle at the origin with radius 3.

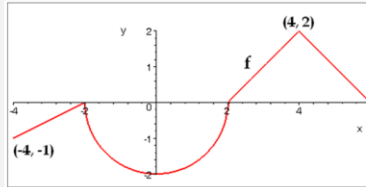


(over)

PROBLEM

Determine the value of each, based on the graph of $y = f(x)$ provided. The graph contains only line segments and a semicircle.

(a) $\int_0^2 f(x) dx$ (b) $\int_{-4}^6 f(x) dx$ (c) $\int_{-4}^6 |f(x)| dx$



a) $-\frac{2^2\pi}{4} = -\frac{4\pi}{4} = -\pi$
 b) $\int_{-4}^{-2} f(x) dx + \int_{-2}^2 f(x) dx + \int_2^6 f(x) dx$
 $-\frac{1}{2}(2) \cdot 1 - \frac{\pi \cdot 2^2}{2} + \frac{1}{2}(2)(4)$
 $-1 - 2\pi + 4$
 $3 - 2\pi$
 c) $\int_{-4}^{-2} |f(x)| dx + \int_{-2}^2 |f(x)| dx + \int_2^6 |f(x)| dx$
 $|\frac{1}{2}(2) \cdot 1| + |\frac{\pi \cdot 2^2}{2}| + |\frac{1}{2}(2)(4)|$
 $1 + 2\pi + 4$
 $5 + 2\pi$

Below is a nice little device you can use to solve these problems:

