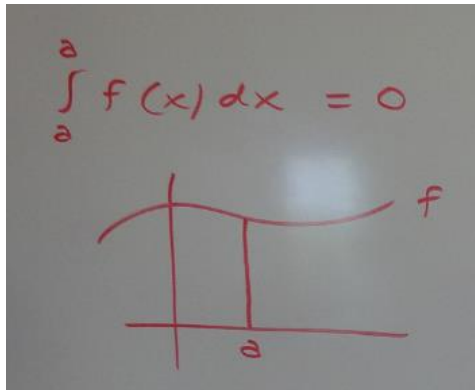


June 9, 2017

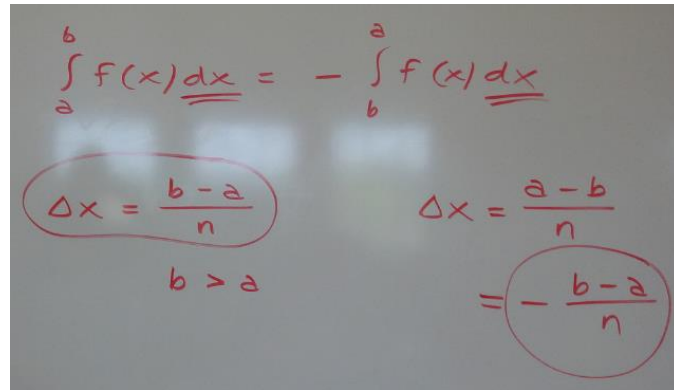
4.2: The Definite Integral (continued)

Pictures to support concepts....

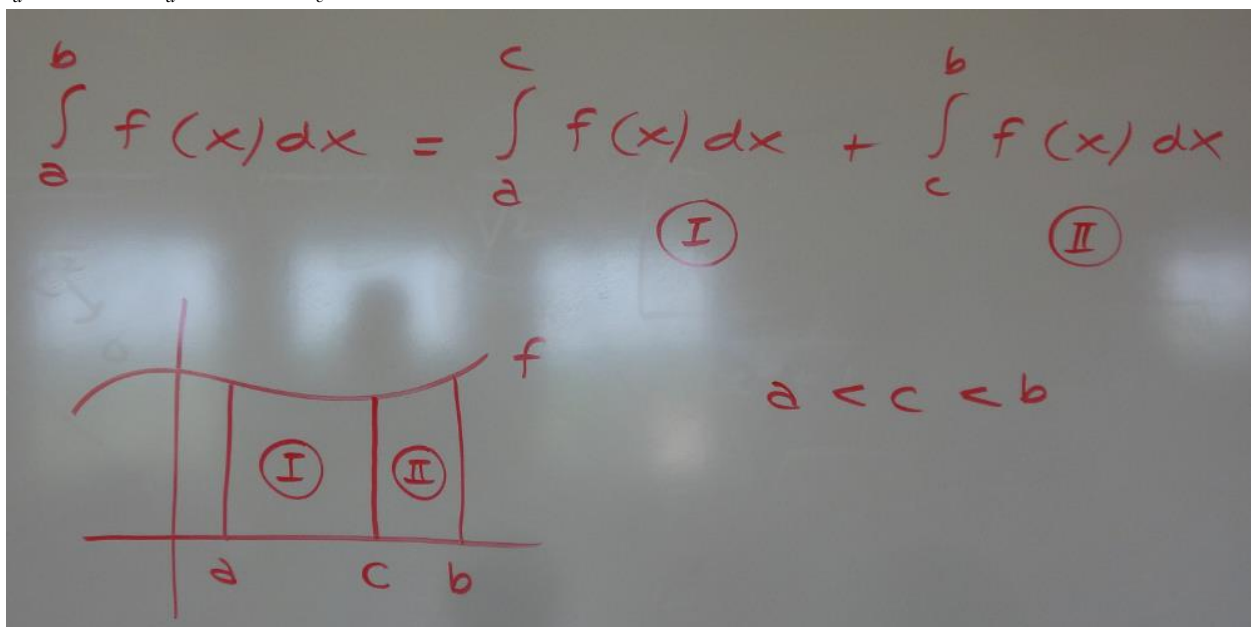
$$\int_a^a f(x) dx = 0$$



$$\int_a^b f(x) dx = -\int_b^a f(x) dx$$



$$\int_a^b f(x) dx = \int_a^c f(x) dx + \int_c^b f(x) dx$$



WARM UP

If you know $\int_2^6 f(x) dx = 10$ and

$\int_2^6 g(x) dx = -2$, determine the value of

(a) $\int_2^6 [f(x) - g(x)] dx$ and (b) $\int_2^6 [3f(x) + g(x)] dx$.

$$\int_2^6 f(x) dx = 10$$

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

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

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

$$3 \int_2^6 f(x) dx + \int_2^6 g(x) dx$$

$$3 * 10 + -2$$

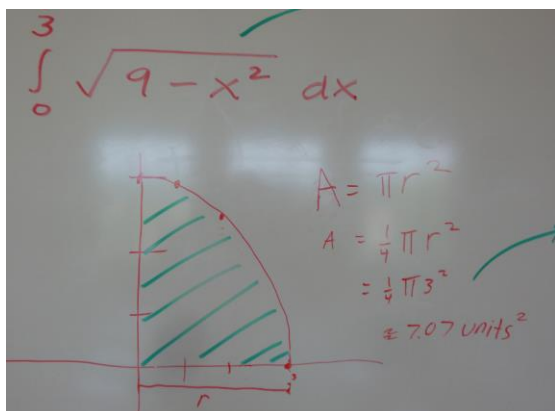
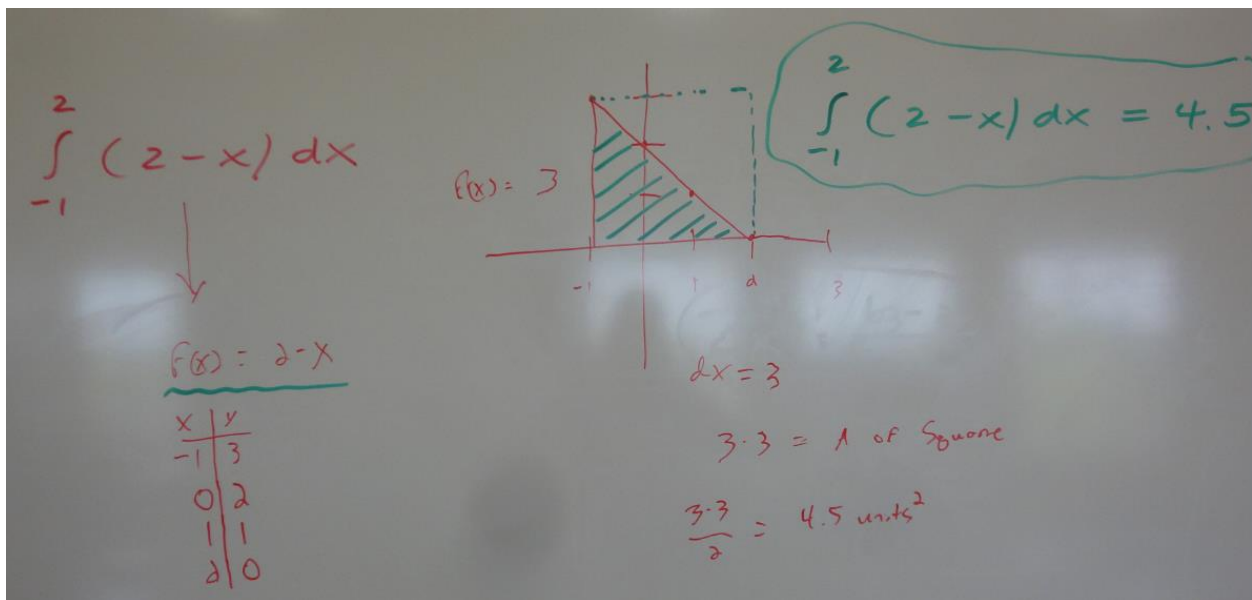
$$30 + -2$$

$$28$$

PROBLEM

Draw a picture and use **geometry** to determine the following:

(a) $\int_{-1}^2 (2-x) dx$ (b) $\int_0^3 \sqrt{9-x^2} dx$



Handwritten equations for problem (b):

$$y = \sqrt{9-x^2}$$

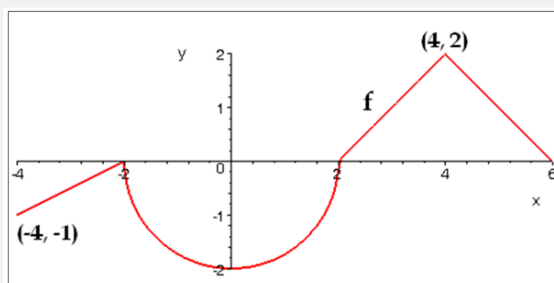
$$y^2 = 9-x^2$$

$$x^2 + y^2 = 9 = 3^2$$

PROBLEM

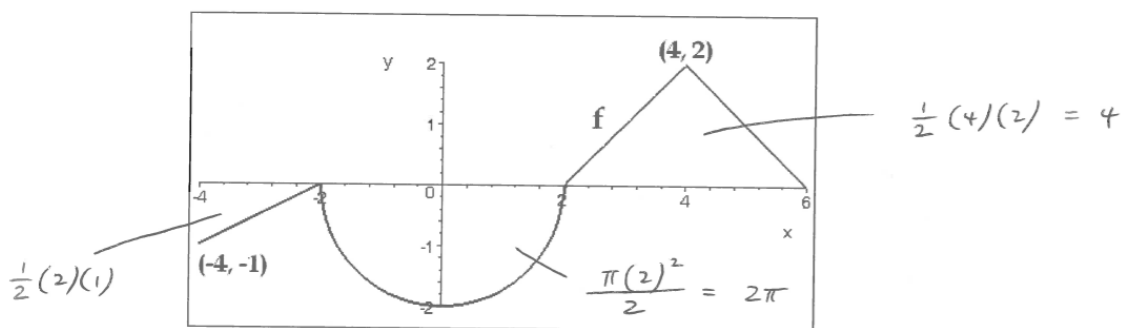
Determine the value of each, based on the graph of $y = f(x)$ provided. The graph contains only line segments and a semicircle.

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



Solutions from last year's quiz:

5. The graph of f consists of line segments and a semicircle, as shown in the figure. Evaluate each definite integral by using geometric formulas.



(a) (3 points) $\int_0^2 f(x) dx = -\pi$

(b) (3 points) $\int_{-4}^6 f(x) dx = -1 - 2\pi + 4 = 3 - 2\pi$

(c) (3 points) $\int_{-4}^6 |f(x)| dx = 1 + 2\pi + 4 = 5 + 2\pi$