Ex 1. (a) Compute the indefinite integral:

$$\int 9x^2 + \frac{1}{x} + 8\cos x \; dx$$

(b) Compute the definite integral:

$$\int_{\pi}^{2\pi} 9x^2 + \frac{1}{x} + 8\cos x \; dx$$

Ex 2. Compute the derivative of the following functions:

(a) $g(x) = \displaystyle\int_1^x \frac{1}{1+t^4}\, dt$

(b) $h(s) = \displaystyle\int_0^{s^4} \sqrt{x+\sqrt{x}}\, dx$

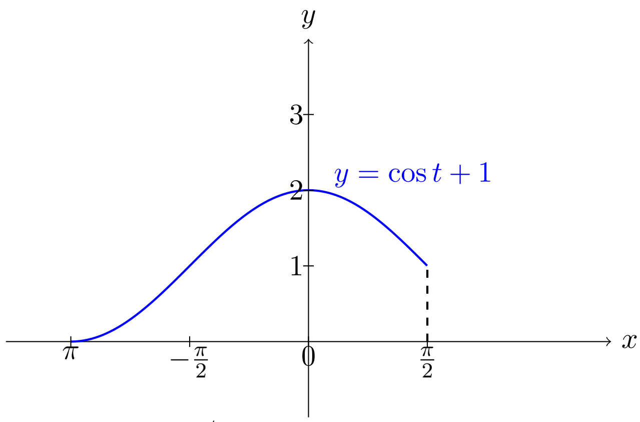
(c) $\displaystyle\int_{\cos x}^{1} e^t + \sin t + 8\ln t + 2\, dt$

Ex 3. Express the following limit of Riemann sums as a definite integral over the interval $[1,5]$:

$$\lim_{n\to\infty} \sum_{i=1}^{n} \left(\ln\left((x_i^*)^3 + 2\right) - \frac{x_i^* + 3}{4 - \cos(x_i^*)} \right) \Delta x.$$

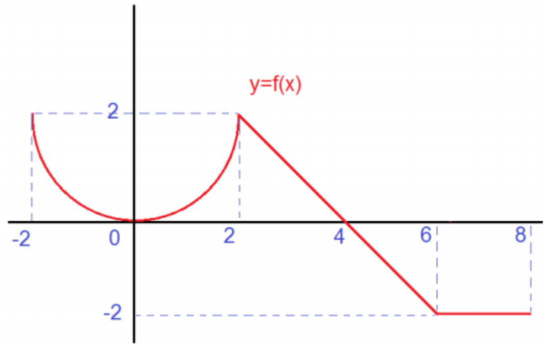
Ex 4. a) Approximate $\displaystyle\int_{-\pi}^{\pi/2} \cos t + 1 \; dt$ using the left Riemann sum with $n = 3$.

b) Draw the rectangles associate to the previous Riemann sum in the following graph:



c) Compute the exact value of $\displaystyle\int_{-\pi}^{\pi/2} \cos t + 1 \; dt$.

Ex 5.



Use the graph of the function f above to compute the definite integral:

$$\int_{-2}^{6} 2f(x)dx + \int_{2}^{6} 8f(x)dx + \int_{8}^{2} f(x)dx$$

Ex 6. An alligator starts running with velocity 10 mi/h. At some point, he starts decelerating with constant deceleration of $200\,\text{mi/h}^2$.

(a) Find the velocity of the alligator (from the moment he started decelerating) as a function of time.

(b) Find how much time does it take for the alligator to stop (from the moment he started decelerating).

(c) Find how many miles did the alligator cross (from the moment he started decelerating) until he stopped moving.