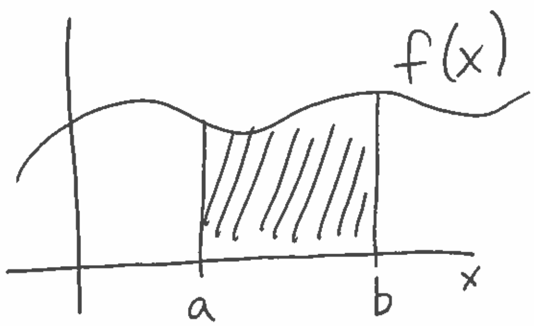
Chapters 5 and 6.1-6.3

Exercise 1: A car is moving at a rate of $f(t) = t^2 + 2t$ meters per second for $0 \leq t \leq 6$ where t is given in seconds. Use a left and right Riemann sum with $n = 3$ subintervals do estimate $\int_0^6 f(t)dt$. Which is the overestimate and which is the underestimate? What are the units of $\int_0^6 f(t)dt$ and what does it represent?

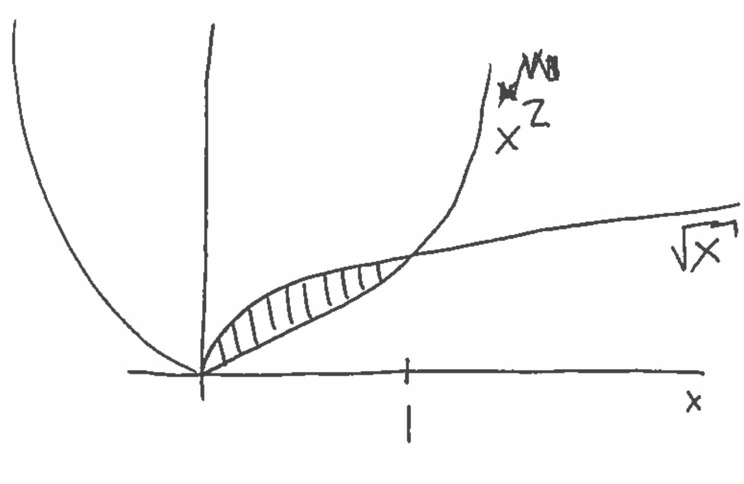
Exercise 2: Let $f(t)$ be a continuous function on the interval $[a, b]$. In your own words, explain what $\int_a^b f(t)dt$ represents and how we estimate it.

Exercise 3: The rate of change of a quantity is given by $g(t) = 1 - t^2$ for $0 \leq t \leq 8$. Find an overestimate for $\int_0^8 g(t)dt$ using a Riemann sum with $n = 4$ subintervals.

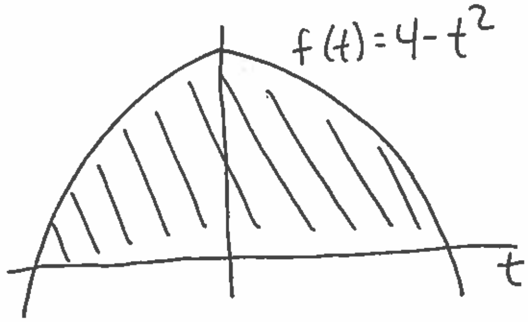
Exercise 4: Consider the graph below. Represent the indicated area as a definite integral.



Exercise 5: Consider the graph below. Represent the indicated area as a definite integral.



Exercise 6: Consider the graph below. Represent the indicated area as a definite integral.



Exercise 7: Pollution is removed from a lake on day t at a rate of $f(t)$ kg/day. Give the meaning of $\int_5^{15} f(t)dt = 4000$ and give units.

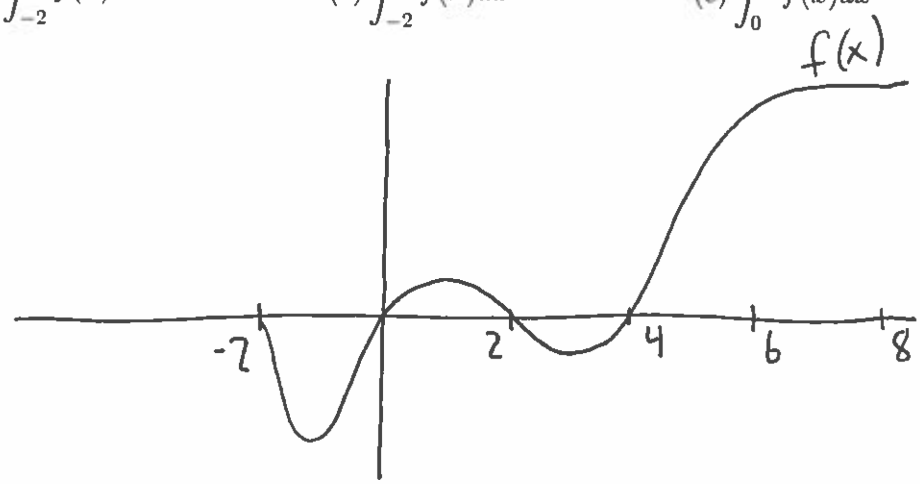
Exercise 8: Oil leaks out of a tanker at a rate of $r = g(t)$ gallons per minute, where t is in minutes. Write a definite integral expressing the total quantity of oil which leaks out of the tanks in the first hour.

Exercise 9: A warehouse charges \$5 per day for every 10 cubic feet of space used for storage. The amount of cubic feet that one company uses on day t is given by $g(t) = 3000 - 50t$ cubic feet per day. Use the graph of $g(t)$ to determine the amount of money the company had to pay in the first 30 days.

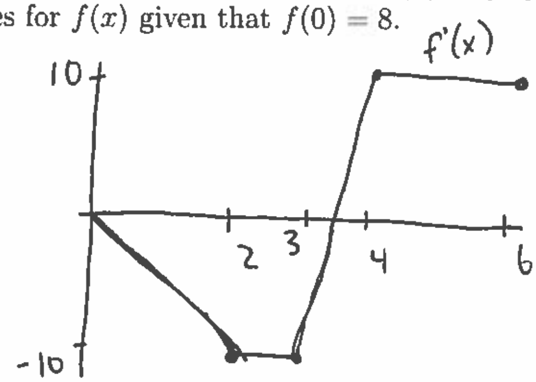
Exercise 10: Use the graph of the function $g(x) = 4x - 8$ to evaluate $\int_2^6 g(x)dx$.

Exercise 11: Consider the graph of $f(x)$ given below. Determine if each of the following is positive, negative or zero.

(a) $\int_{-2}^{8} f(x)dx$ (b) $\int_{-2}^{2} f(x)dx$ (c) $\int_{0}^{4} f(x)dx$

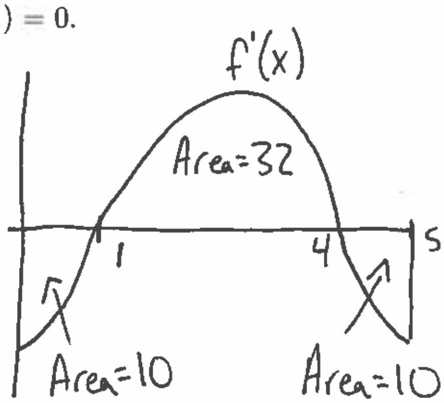


Exercise 12: The derivative $f'(x)$ is graphed below. Fill in the table of values for $f(x)$ given that $f(0) = 8$.



x	0	2	4	6
f(x)				

Exercise 13: The derivative $f'(x)$ is graphed below. Sketch a graph of $f(x)$ and clearly indicate all values of the local maxima and minima given that $f(1) = 0$.



Exercise 14: Find the indefinite integral of $\int (5x + 7)dx$.

Exercise 15: Find the indefinite integral of $\int (t^2 + 5t + 1)dt$.

Exercise 16: Find the indefinite integral of $\int (\frac{3}{x} - \frac{2}{t^2})dx$.

Exercise 17: Find the indefinite integral of $\int (3\sqrt{w})dw$.

Exercise 18: Find the indefinite integral of $\int (e^x + \frac{1}{\sqrt{x}})dx$.

Exercise 19: Find the indefinite integral of $\int (100e^{4t})dt$.

Exercise 20: Find the indefinite integral of $\int (2\pi r)dr$.

Exercise 21: Find the derivative of $f(x) = e^{x^2}$.

Exercise 22: Use the previous problem to evaluate $\int_0^6 (2xe^{x^2})dx$.

Exercise 22: Find the derivative of $g(t) = t^2 \ln(t)$.

Exercise 23: Use the previous problem to evaluate $\int_1^4 (2t\ln(t) + t)dt$.

Exercise 24: Evaluate $\int_0^3 t^3 dt$.

Exercise 25: Evaluate $\int_4^9 \sqrt{x} dx$.

Exercise 26: Evaluate $\int_0^2 (3t^2 + 4t + 3)dt$.

Exercise 27: Evaluate $\int_0^1 2e^x dx$.

Exercise 28: Evaluate $\int_2^7 (\frac{1}{t} - \frac{2}{t^3})dt$.

Exercise 29: Evaluate $\int_0^1 (y^2 + y^4)dy$.