



Math 141 Tutorial 5

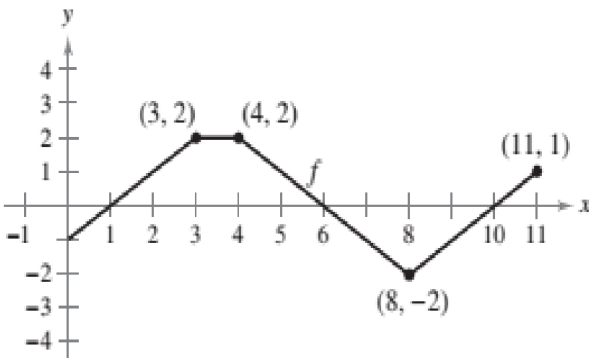
Problem 1

Express the limit as a definite integral and evaluate it.

$$\lim_{n \rightarrow \infty} \sum_{i=1}^n \sqrt[3]{\left(1 + \frac{2i}{n}\right) \frac{2}{n}}$$

Problem 2

The graph of f consists of line segments, as shown in the figure below. Find the average value of f on $[1, 5]$.



Problem 3

Given that $\int_0^1 f(x) dx = 5$, $\int_0^3 f(x) dx = 3$, $\int_3^7 f(x) dx = 1$ find each of the following:

- (a) $\int_0^7 f(x) dx$ (b) $\int_1^3 f(x) dx$ (c) $\int_1^7 f(x) dx$ (d) $\int_3^0 f(x) dx$

Problem 4

Calculate $\int \frac{x^2 - 4}{\sqrt[3]{x^2}} dx$.

Calculate $\int (x + 1)\sqrt{x} dx$.

Calculate $\int (\sqrt{x} + 2)^2 dx$.

Problem 5

(a)

Calculate $\frac{d}{dx} \left(\int_{1/x}^{1/\sqrt{x}} \sin t^2 dt \right)$.

(b)

Find $H'(2)$ given that $H(x) = \int_{\sqrt{x}}^{x^2+x} \frac{3}{2 + \sqrt{2}t} dt$.

Problem 6

Evaluate $\int_0^{\pi/4} \sec^2 x dx$.

Evaluate $\int_0^{\pi/6} \sec x \tan x dx$.

Evaluate $\int_1^3 f(x) dx$, where $f(x) = \begin{cases} (x+1)^2, & 1 \leq x \leq 2 \\ 3-x^2, & 2 < x \leq 3 \end{cases}$.

Problem 7

A particle which starts at the origin moves along the x -axis from time $t = 0$ to time $t = 3$ with velocity $v(t) = t^2 - t - 2$. Determine the final position of the particle and the total distance traveled.

Problem 8

Calculate $\int \frac{x^2}{\sqrt{x+1}} dx$.

Calculate $\int \frac{x-2}{(x^2-4x+4)^2} dx$.

Evaluate $\int_0^1 \frac{dx}{\sqrt{x+1}}$.

Evaluate $\int_1^2 (x^2+1)\sqrt{2x^3+6x} dx$.