Section 5.4. Theorems about definite integrals

Example 1 What is the integral of $g$ from 1 to 8 if its integral from 1 to 5 is $-7$ and its integral from 5 to 8 is 9?

Answer: $\int_{1}^{8} g(x) \, dx = 2$

Example 2 What is $\int_{-35}^{35} [2p(x) - 3q(x)] \, dx$ if $\int_{-35}^{35} p(x) \, dx = 10$ and $\int_{-35}^{35} q(x) \, dx = 20$?

Answer: $\int_{-35}^{35} [2p(x) - 3q(x)] \, dx = -40$

Example 3 What is $\int_{3}^{4} Y(x) \, dx$ if $\int_{0}^{4} Y(x) \, dx = 100$ and $\int_{4}^{3} Y(x) \, dx = -25$?

Answer: $\int_{3}^{4} Y(x) \, dx = -75$

Example 4 What is $\int_{0}^{3} [2f(x) - 4g(x)] \, dx$ if $\int_{0}^{3} f(x) \, dx = 100$ and $\int_{0}^{3} g(x) \, dx = 200$?

Answer: $\int_{0}^{3} [2f(x) - 4g(x)] \, dx = -600$

Example 5 Use the formulas for areas of rectangles and circles to evaluate

$\int_{0}^{2} (5 - 3\sqrt{4 - x^2}) \, dx$.

Answer: $\int_{0}^{2} (5 - 3\sqrt{4 - x^2}) \, dx = 10 - 3\pi$

Interactive Examples

Work the following Interactive Examples on Shenk's web page, http://www.math.ucsd.edu/~ashenk/;

Section 6.2: Example 6

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1Lecture notes to accompany Section 5.4 of Calculus by Hughes-Hallett et al.

2The chapter and section numbers on Shenk’s web site refer to his calculus manuscript and not to the chapters and sections of the textbook for the course.