(9/30/08)

Math 10B. Lecture Examples.

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: $\displaystyle\int_1^8 g(x)\,dx = 2$

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

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

Example 3 **What is $\displaystyle\int_{\mathbf{3}}^{\mathbf{0}} \mathbf{Y}(\mathbf{x})\,\mathbf{dx}$ if $\displaystyle\int_{\mathbf{0}}^{\mathbf{4}} \mathbf{Y}(\mathbf{x})\,\mathbf{dx} = 10$0 and $\displaystyle\int_{\mathbf{4}}^{\mathbf{3}} \mathbf{Y}(\mathbf{x})\,\mathbf{dx} = -25$?**

Answer: $\displaystyle\int_3^0 Y(x)\,dx = -75$

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

Answer: $\displaystyle\int_0^3 [2f(x) - 4g(x))]\,dx - 600$

Example 5 **Use the formulas for areas of rectangles and circles to evaluate $\displaystyle\int_{\mathbf{0}}^{\mathbf{2}} (\mathbf{5} - \mathbf{3}\sqrt{\mathbf{4} - \mathbf{x^2}})\,\mathbf{dx}$.**

Answer: $\displaystyle\int_0^2 (5 - 3\sqrt{4 - x^2})\,dx = 10 - 3\pi$

Interactive Examples

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

Section 6.2: Example 6

[†]Lecture notes to accompany Section 5.4 of *Calculus* by Hughes-Hallett et al.

[‡]The 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.