(9/30/08)

Math 10B. Lecture Examples.

Section 5.2. The definite integral†

Example 1 **Use the formula for the area of a triangle to evaluate $\int_{-3}^{3} (x+1)\,dx$.**

Answer: Figure A1 • $\int_{-3}^{3} (x+1)\,dx = 6$.

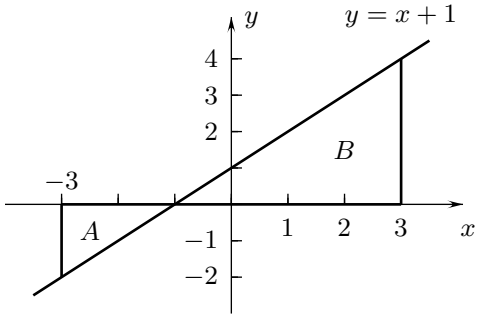

FIgure A1

Example 2 **Calculate the right Riemann sum for $\int_0^1 x^2\,dx$ corresponding to the partition of [0,1] into five equal subintervals. Draw the curve $y = x^2$ with the rectangles whose areas give the Riemann sum.**

Answer: Figure A2 • [Right Riemann sum] = 0.44

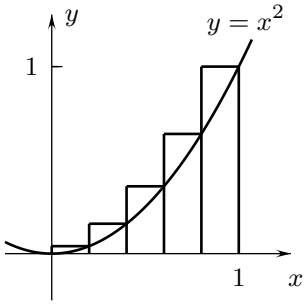

Figure A2

†Lecture notes to accompany Section 5.2 of *Calculus* by Hughes-Hallett et al.

Example 3 **Use the fact that the curve $\mathbf{y = \sqrt{16 - x^2}}$ is the upper half of the circle $\mathbf{x^2 + y^2 = 16}$ of radius 4 to find the exact value of $\mathbf{\int_{-4}^{0} \sqrt{16 - x^2}\, dx}$.**

Answer: Figure A3 • $\int_{-4}^{0} \sqrt{16 - x^2}\, dx = 4\pi$

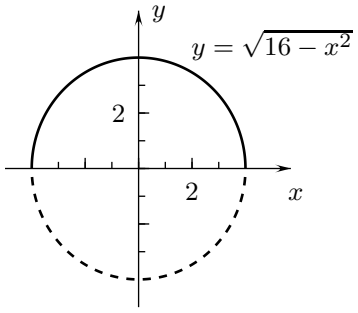

Figure A3

Example 4 **Use five rectangles of equal width to find the approximate value of $\mathbf{\int_0^{50} H(x)\, dx}$ for the function $\mathbf{y = H(x)}$ of Figure 1.**

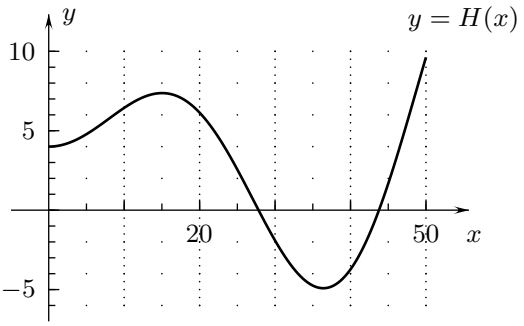

FIGURE 1

Answer: One answer: Figure A4 • $\int_0^{50} H(x)\, dx \approx (5 + 7 + 2.5 - 5 + 4)(10) = 135$

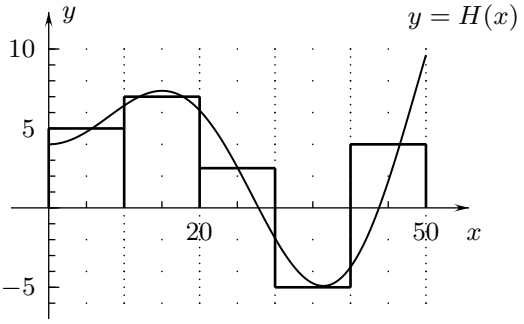

Figure A4

Interactive Examples

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

Section 6.2: 1–4

‡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.