(9/30/08)

Math 10B. Lecture Examples.

Section 7.7. Improper integrals[†]

Example 1 **Evaluate** $\displaystyle\int_3^\infty \frac{1}{x^3}\,dx$.

Answer: $\displaystyle\int_3^\infty \frac{1}{x^3}\,dx = \frac{1}{18}$

Example 2 **Find the area of the region between $y = 1/x$ and the x-axis for $x \geq 1$.**

Answer: Figure A1 • [Area] $= \infty$

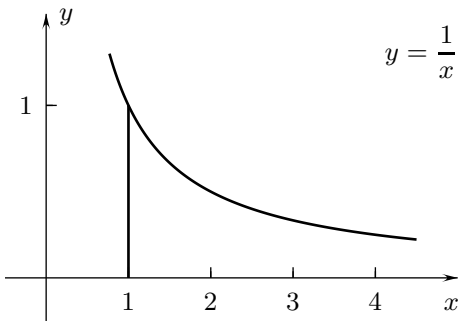

Figure A1

Example 3 **Is** $\displaystyle\int_0^\infty \cos x\,dx$ **defined?**

Answer: $\displaystyle\int_0^\infty \cos x\,dx$ is not defined.

Example 4 **Evaluate** $\displaystyle\int_0^9 \frac{1}{\sqrt{x}}\,dx$.

Answer: $\displaystyle\int_0^9 \frac{1}{\sqrt{x}}\,dx = 6$

[†]Lecture notes to accompany Section 7.7 of *Calculus* by Hughes-Hallett et al

Example 5 **Find the average value of $y = x^{-1/3}$ for $0 \le x \le 8$ and give a geometric interpretation of the result.**

Answer: [Average value] $= \frac{3}{4}$ • The area of region A is equal to the area of region B in Figure A5.

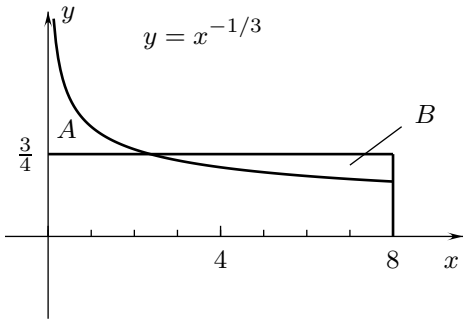

Figure A5

Interactive Examples

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

Section 8.6: Examples 1–5

[‡]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.