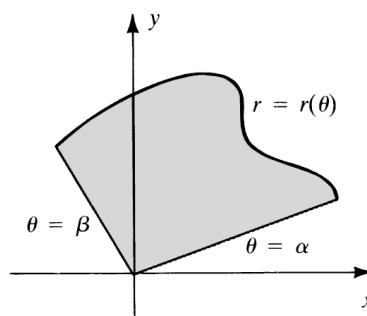


Math 20B. Lecture Examples.

Section 11.4. Area in polar coordinates[†]

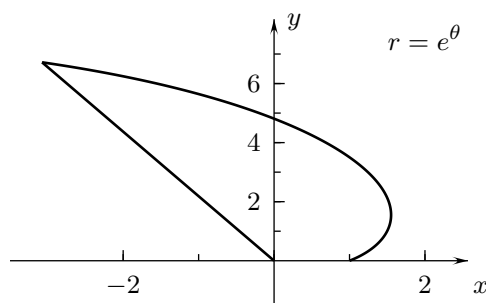
$$[\text{Area}] = \frac{1}{2} \int_{\alpha}^{\beta} [r(\theta)]^2 d\theta$$



Example 1 Find the area of the region in an xy -plane between the curve with the polar equation $r = e^{\theta}$ and the origin for $0 \leq \theta \leq 2$.

Answer: Figure A1 • $[\text{Area}] = \frac{1}{4}(e^4 - 1)$

Figure A1



[†]Lecture notes to accompany Section 11.4 of *Calculus, Early Transcendentals* by Rogawski.

Example 2 Use polar coordinates to calculate the area of the triangle with vertices $(0, 0)$, $(1, 0)$, and $(1, 1)$.

Answer: Figure A2 • $[\text{Area}] = \frac{1}{2} \int_0^{\pi/4} \sec^2 \theta \, dx = \frac{1}{2}$

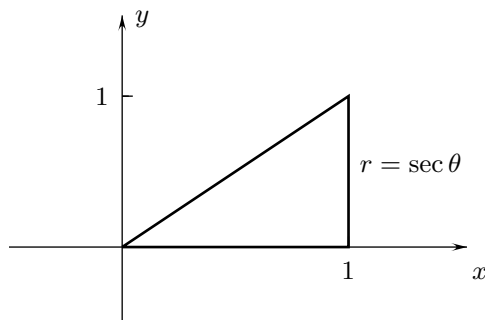


Figure A2

Interactive Examples

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

Section 11.3: Examples 6 and 7

[‡]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.