

Lecture 27: Review Problems

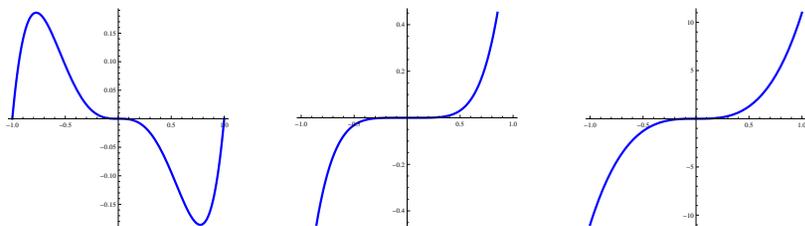
Definite integral

- 1 The following integral defines the area of a region. Draw it:

$$\int_{\pi/2}^{\pi} x - \sin(x) dx .$$

Catastrophes

- 2 Lets look at the family of functions $f_c(x) = x^5 + cx^3$. You see three graphs. They display the function for $c = -1$, $c = 0$ and $c = 1$. What can you say about catastrophes?

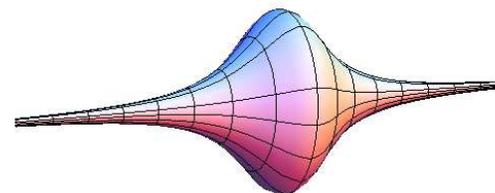


Area

- 3 Find the area of the region bound by $y = 2 - x$, $x = y$, $y = 0$ and $y = 1$.

Volumes

- 4 If we rotate the witch of Agnesi $y = (1 + x^2)^{-1}$ around the x axes, we obtain a solid. Find its volume. **Hint.** To find the integral, compute the derivative of $x/(1 + x^2)$ and get inspired.



Related Rates

- 5 The curve $x^2 - y^2 = 3y$ is an example of a hyperbola. If $x(t) = 2 + t$. Find the related rate y' near $(2, 1)$.

