

## Lecture 28: Review Problems

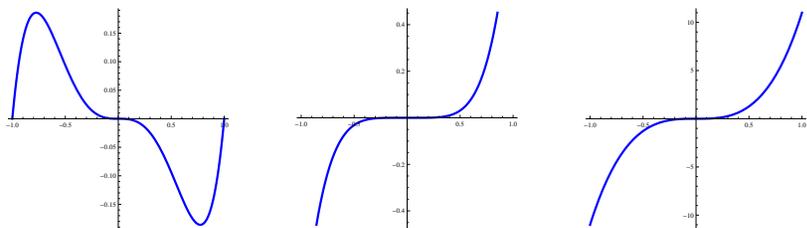
### Definite integral

- 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

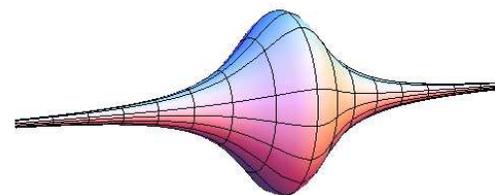
- 3 Find the area of the region bound by  $y = 2 - x$ ,  $x = y$ ,  $y = 0$  and  $y = 1$ .

### 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.

**Solution:**

$$\pi^2/2.$$



### 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  $(2, 1)$ .

