

## Differentiating Parametric Equations

When calculating the slope of a parametric function, we can use the following rule:

$$\frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}}$$

Example ( $x = \sec t$ ,  $y = \tan t$ ,  $-\frac{\pi}{2} < t < \frac{\pi}{2}$ )

$$\begin{aligned}\frac{dy}{dx} &= \frac{dy/dt}{dx/dt} \\ &= \frac{\sec^2 t}{\tan t \sec t} \\ &= \frac{\sec t}{\tan t} \\ &= \csc t\end{aligned}$$

To find the tangent to the line at  $(\sqrt{2}, 1)$  where  $t = \pi/4$ :

$$\left. \frac{dy}{dx} \right|_{\frac{\pi}{4}} = \csc\left(\frac{\pi}{4}\right) = \sqrt{2}$$

Then

$$y = \sqrt{2}(x - \sqrt{2}) + 1 = \sqrt{2}x - 1$$

Notes

## Equations of Normal Lines

Example (Find the equation of the line normal to the curve  $x = \cos t$ ,  $y = t \sin t$  at  $t = \pi$ )

$$\begin{aligned}\frac{dy}{dt} &= \sin t + t \cos t & x &= \cos \pi/2 = 0 \\ \frac{dx}{dt} &= -\sin t & y &= \pi/2 \sin \pi/2 = \pi/2 \\ \frac{dy}{dx} &= \frac{\sin t + t \cos t}{-\sin t} & m &= 1 \\ \left. \frac{dy}{dx} \right|_{t=\pi/2} &= \frac{\sin \pi/2 + \pi/2 \cos \pi/2}{-\sin \pi/2} & y &= 1(x - 0) + \pi/2 = x + \pi/2 \\ &= \frac{1 + \pi/2(0)}{-1} = -1\end{aligned}$$

Notes

## Homework

Section 3.6 (page 153): 33 - 37 Odd, 41 - 48 (11 problems)

33  $(f \circ g)' =$

35  $(f \circ g)' =$

37  $(f \circ g)' =$

41  $y =$

42  $y =$

43  $y =$

44  $y =$

45  $y =$

46  $y =$

47  $y =$

48  $y =$

Notes

## Rotating Homework Assignment - Class Binder

Notes

**Objective** As a class, to create a binder that includes all the reference materials for the course

**Method** Each day one student will be responsible for updating the binder.

- Notes**
- Notes can consist of printed out and marked up (and if need be corrected) slides, or handwritten notes.
  - Notes must be complete. Discuss with teacher after school to clear up any confusion.
  - Notes include daily handouts.

**Hand-In** The following day hand in a packet containing everything that should be added to the binder. The packet will be graded for correctness.

**Schedule** Each student will be required to take notes at least three times. If there is no notetaker on a given day, a student will be assigned by the teacher.

Notes

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