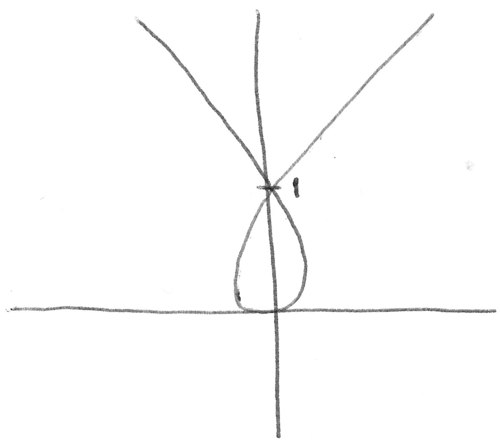
Calculus Study Guide: 11.1

Find the slope of c(t) = (e^t – 1, sin t) at t = 2

$\frac{dx}{dt} = e^t \to e^2$ $\qquad$ slope $= \frac{\cos 2}{e^2} = -0.0563$

$\frac{dy}{dt} = \cos t \to \cos 2$

Given $c(t)=(t^3-t,t^2)$, sketch the curve and show that there are two tangent lines at the point (0, 1).



Find the equations of the 2 tangent lines to the parametric curve at $(0,1)$.

$\frac{dx}{dt} = 3t^2-1$ $\qquad$ $c(t)$ goes Through $(0,1)$ for $t=\pm 1$

$\frac{dy}{dt} = 2t$ $\qquad$ $\left.\frac{dy}{dx}\right|_{t=-1} = \frac{-2}{2} = -1$ $\qquad$ $y-1=-x$

$\frac{dy}{dx} = \frac{2t}{3t^2-1}$ $\qquad$ $\left.\frac{dy}{dx}\right|_{t=1} = \frac{2}{2} = 1$ $\qquad$ $y-1=x$

Find the slope of the tangent line to the curve $c(t)=(t^3+1,\ln(1+t))$ at $t=1$.

$\frac{dx}{dt} = 3t^2$ $\qquad$ $\left.\frac{dy}{dx}\right|_{t=1} = \frac{1}{3(2)} = \frac{1}{6}$

$\frac{dy}{dt} = \frac{1}{1+t}$

$\frac{dy}{dx} = \frac{\frac{1}{1+t}}{3t^2} = \frac{1}{3t^2(1+t)}$