

Math275-002
Fourth Written Assignment
Due at class time
Monday, 20 September

- (1) Find the curvature κ , the unit tangent vector \mathbf{T} and the unit normal vector \mathbf{N} for the curve

$$\mathbf{r}(t) = \langle e^t \cos(t), e^t \sin(t), 2 \rangle$$

- (2) Find the curvature at each point (x, y) on the left branch of the hyperbola $b^2x^2 - a^2y^2 = a^2b^2$. (Determine how to parameterize the hyperbola as a vector valued function and work from there.)
- (3) Find the tangential and normal components of the acceleration for the following interpreting $\mathbf{r}(t)$ as the position of an object at time t .

$$\mathbf{r}(t) = \langle e^t \cos(t), e^t \sin(t), e^t \rangle$$

- (4) Sketch the level curves $f(x, y) = c$ for $c = 0$, $c = 1/4$, and $c = 1/2$ if

$$f(x, y) = \frac{x^2}{x^2 + y^2}$$