

Calc 3: Assignment # 10

Note Title

9/24/2011

① Show that $\frac{d}{dt} (\vec{r}'(t) \times \vec{r}''(t)) = \vec{r}'(t) \times \vec{r}'''(t)$

② Find the unit tangent, the normal, and the curvature:

a) $\vec{r}(t) = \langle t^2, \sin(t) - t \cos(t), \cos(t) + t \sin(t) \rangle, t > 0$

b) $\vec{r}(t) = \langle t, \frac{1}{2}t^2, t^3 \rangle$

③ Find the curvature:

a) $\vec{r}(t) = \langle t, t, 1+t^2 \rangle$

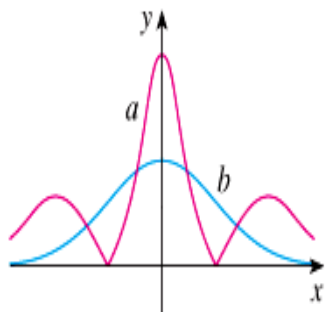
b) $\vec{r}(t) = \langle e^t \cos(t), e^t \sin(t), t \rangle$

④ Find a formula for the curvature of a function $y = f(x)$. Hint: write the function in parametric form, then embed in \mathbb{R}^3 .

Then compute the curvature using cross products.

⑤ Which of the following curves is the original function $f(x)$, which is its curvature as a

function:



⑥ Find the vectors T , N , and B for:

a) $\vec{r}(t) = \langle t^2, \frac{2}{3}t^3, t \rangle$ at $(1, \frac{2}{3}, 1)$

b) $\vec{r}(t) = \langle \cos(t), \sin(t), \ln(\cos(t)) \rangle$ at $(1, 0, 0)$