Name: Key

Calculus 251:C3 Quiz #5 - 6/2/2020 Topic: Sections 13.1-13.3

Instructions. Answer the questions in the spaces provided or on your own paper, then scan and upload to Canvas. Show and label all of your work. Responses with no work may receive no credit even if the answer is correct.

6 pts (1) Find a parametrization of the line tangent to $\vec{r}(t) = \langle 2t^2, t^3, 5-t \rangle$ at $t = 2$.

$\vec{r}(2) = \langle 8, 8, 3 \rangle$

$\vec{r}\,'(t) = \langle 4t, 3t^2, -1 \rangle$

$\vec{r}\,'(2) = \langle 8, 12, -1 \rangle$

Let $\vec{v} = \vec{r}\,'(2)$ and $\vec{x}_0 = \vec{r}(2)$

Then the tangent line has parametrization

$\vec{r}_t(s) = \langle 8, 8, 3 \rangle + s\langle 8, 12, -1 \rangle$

or $\vec{r}_t(s) = \langle 8+8s, 8+12s, 3-s \rangle$

4 pts (2) Find a parametrization of the intersection of the surfaces $x^2 + y^2 = 4$ and $z = xy$

The first equation suggests using $\sin(t)$ and $\cos(t)$ for y and x

$\langle 2\cos t, 2\sin t, z(t) \rangle$

By the second equation

$z(t) = x(t)\,y(t) = (2\cos t)(2\sin t) = 4\sin t\cos t$

So the intersection is parametrized by

$\vec{r}(t) = \langle 2\cos t, 2\sin t, 4\sin t\cos t \rangle$, $t \in [0, 2\pi]$

or

$\vec{r}(t) = \langle 2\cos t, 2\sin t, 2\sin(2t) \rangle$, $t \in [0, 2\pi]$