

Math 241 Class Exercise: Tangent Vectors to Parametric Curves

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1. Find a vector equation for the tangent line to the curve of intersection of the cylinders $x^2 + y^2 = 25$ and $y^2 + z^2 = 20$ at the point $P(3, 4, 2)$. Plot the curve of intersection by using Matlab. Now, draw the curve by hand and accurately draw the tangent vector at the point $P(3, 4, 2)$. Discuss with your partner how this is related to representations of vectors that was discussed earlier in the semester.
2. Find the points of intersection of the tangent lines to the curve $\vec{r}(t) = \langle \sin \pi t, 2 \sin \pi t, \cos \pi t \rangle$ at the points where $t = 0$ and $t = 0.5$. To start this problem, plot the curve using Matlab. Then draw the curve on paper and then draw the tangent lines to visualize the intersection point. Now compute the point.
3. At what point do the curves $\vec{r}_1(t) = \langle t, 1 - t, 3 + t^3 \rangle$ and $\vec{r}_2(t) = \langle 3 - t, t - 2, t^2 \rangle$ intersect? Is this problem a trick question the way it is written?