COMPUTER PROJECT 2
Space Curves, Arc Length, and Curvature

Instructions: Use *Mathematica* to solve the following problems. Be sure to clearly label each section of your notebook based on which problem you are solving. You can change an input cell to a text cell by selection the Format tab from the top menu and choosing Text from the Style option. Email a copy of your finalized notebook to `byoung@wyomingseminary.org` with the subject "Computer Project 2."

For this project, you will be given a periodic space curve (with period 2π), $\vec{r}(t)$. The curve is different for each student and can be found on the next page.

1) Use the `ParametricPlot3D` command to generate a plot of the space curve for $0 \leq t \leq 2\pi$.

2) Use the `ArcLength` command to numerically compute the arc length of the curve over the interval $0 \leq t \leq 2\pi$. Make sure your answer is accurate to at least 3 decimal places. You will need to pass the option `WorkingPrecision` $\rightarrow$ `10` to the `ArcLength` command.

3) Use *Mathematica* to give a plot of the curvature of your space curve as a function of t over $0 \leq t \leq 2\pi$. You can use the command `ArcCurvature` to compute the function.

4) Use the command `FindMaximum` to identify the point of maximum curvature. Give a second plot of the space curve where you explicitly mark this point.

Student Data

Student	**Space Curve**
Yang Cao	$\langle 4\sin^2(2t) + 2\cos(3t),\ 2\sin(2t) + 6\cos^2(3t),\ \sin^2(t) + 6\sin(2t)\cos(3t)\rangle$
Abigail Ryu	$\langle 6\sin^2(4t) + 5\cos(3t),\ 5\sin(4t) + 5\cos^2(3t),\ \sin^3(t) + 6\sin(4t)\cos(3t)\rangle$
Andrew Tsui	$\langle 6\sin^2(4t) + 5\cos(5t),\ 5\sin(4t) + 6\cos^2(5t),\ \sin^3(t) + 4\sin(4t)\cos(5t)\rangle$
Theo Yang	$\langle 6\sin^2(4t) + 4\cos(3t),\ 4\sin(4t) + 3\cos^2(3t),\ \sin^3(t) + 6\sin(4t)\cos(3t)\rangle$