Mathematica Project 3: due March, 14th, at 11:59pm
Multivariate Calculus, MTH 212, Spring 2018

Turn in the project by uploading your Mathematica notebook to the appropriate folder at `http://LIVE.wilkes.edu` at anytime before 11:59 pm on Wednesday, 3/14/18.
The name of your .nb file should identify you clearly. (A good example of a name could be John_Smith_Project2.nb.)

Inside your notebook:

Use the text input mode to start your notebook with your name and project number.

Make sure all the problems are clearly labeled and all questions answered. (Failure to follow these directions will result in lost points.) Make sure that you get the required output by evaluating the notebook, but before submitting, **delete all output from your notebook** - you can find the corresponding command under "Cell" in your notebook top panel.

Note: sorry, but late projects will not be accepted.

1. (15pts) Working with Exercise 30 on page 631, use Mathematica to:
   (a) (5pts) find the equation of the plane (doing the necessary vector computations);
   (b) (10pts) graph the two lines and the plane.
2. (15pts) Working with Exercise 58 on page 631, use Mathematica to:
   (a) (5pts) find the equation of the line (doing the necessary vector computations);
   (b) (10pts) graph the two planes and the plane.
3. (25pts) Working with Exercise 62 on page 639, use Mathematica to:
   (a) (15pts) find the answers to parts (b) through (d);
   (b) (5pts) find the normal vector for the plane determined by the points A, B, C;
   (c) (5pts) graph the plane determined by the points A, B, C.

4. (20pts - 5pts each) Plot the surfaces listed below using *ContourPlot3D*. Pick a range that gives a good view of all the main features of the surface. Label the axes using *AxesLabel* so that I won't lose track of the axes as I rotate your plots. For each plot, identify the surface.

   (a) $x^2 + z^2 = 9$

   (b) $x^2 + z^2 = y^2$

   (c) $4y^2 + z^2 - 4x^2 = 4$

   (d) $36x^2 + 9y^2 + 4z^2 = 36$

5. (25pts) Working with Exercise 18 on page 674, use Mathematica to:

   (a) (15pts) do the required computations to find $\mathbf{T}$, $\mathbf{N}$, $\mathbf{B}$, and κ for the given curve at $t = 0$.

   (b) (10pts) graph the curve (using *ParametricPlot3D*) together with the **TNB**-frame on a slider (using *Manipulate*) for $-2 \leq t \leq 2$.