Name: _____

Math 275 - Calculus III

Summer 2020

Matlab software is available through VLAB at http://vlab.uidaho.edu. Students are encouraged to contact IT help desk if help is needed to find where to store files and how to access Matlab as soon as possible. Some Matlab tutorials and solved sample problems are available on the course web site.

ITS HELP DESK

Phone: 208-885-4357 (HELP); Email: helpdesk@uidaho.edu
Physical Address: Teaching Learning Center Room 128
IT help desk website: http://www.uidaho.edu/its/

Matlab Project - due by July 13

Solve the following problems:

- *(Section 13.1 # 21)* Use Matlab to graph the curve given by the the following parametric equations

$$x = t\cos t, \quad y = t, \quad z = t\sin t, \quad t \in [0, 50]$$

  Make sure you choose a parameter domain and viewpoints that reveal the true nature of the curve. Note: command **plot3** may be useful in plotting 3D curves. When you evaluate the functions $x = t\cos t$ or $z = t\sin t$, set, say, $t = 0 : 0.1 : 50$, and then use a dot to do component-wise multiplication, i.e. $x = t. * \cos(t)$ or $z = t. * \sin(t)$.

- *(Section 13.1 # 35)* Graph the curve with the vector equation

$$\mathbf{r}(t) = \langle \sin 3t \cos t, \frac{1}{4}t, \sin 3t \sin t \rangle, \quad t \in [0, 50]$$

- *(Section 13.2 # 30)* Find parametric equations for the tangent line to the curve with the parametric equations

$$x = 2\cos t, \quad y = 2\sin t, \quad z = 4\cos 2t, \quad t \in [-\pi, \pi]$$

  at the point $(\sqrt{3}, 1, 2)$. Illustrate by graphing both the curve and the tangent line on a common screen. Rotate the graphs to get a good view. Include derivation of the tangent line.

- *(Section 14.1 # 45, # 53)* Use Matlab to graph the functions using different domains and viewpoints. Get a printout of one that, in your opinion, gives a good view. Plot also some contour curves of the same function and compare with the graph. A possible choice of a domain would be $x \in [-2, 2]$, $y \in [-2, 2]$.

  (a) $f(x, y) = x^2 - y^2$

  (b) $f(x, y) = x^2 + 9y^2$

  Note: commands **meshgrid**, **mesh**, **surf**, **contour** may be useful in plotting surfaces and contour curves.

- *(Section 14.4 # 5)* Graph the surface

  $$z = x \sin(x + y)$$

  and the tangent plane at the point $(-1, 1, 0)$. (Choose the domain and viewpoint so that you get a good view of both the surface and the tangent plane.) Then zoom in until the surface and the tangent plane become indistinguishable to provide a second plot. Rotate the graphs to get a good view. Include derivation of the tangent plane.

When computer graphing is required, use Matlab commands **plot**, **plot3**, **mesh**, **surf**, **contour** etc. to visualize your results. Use **xlabel**, **ylabel**, **title** etc. commands to be clear which problem and which function(s) you are plotting. Examples of solved problems are available on the course website.

Submit your m.files or commands you used in the command line together with graphs.

The following command may be useful in saving a figure as a jpeg file:

```
print -djpeg95 graph.jpg
```

Type **help print** for more information on how to print your results.

Some Matlab tutorials are posted on the class web site and there are other available on the internet.