Matlab Project 3 Tim Pilachowski's sections

The due date is provided on the course schedule.

Turn in a printout of your published m-file. See Justin's guide for instructions on how to write an m-file and how to publish it.

Put the command lines for each question in the m-file separated by a blank line then a %% line and then another blank line.

Each question should start with a clear all line followed by the declaration of any symbolic variables necessary for that problem. In other words each question should be completely self-contained.

All 3D graphs should have view ([10 10 10]) set.

1. Plot the portion of $x^2 + z^2 = 9$ above the *xy*-plane and between $y = -1$ and $y = 2$.

2. Plot the portion of the cone $z = 9 - \sqrt{x^2 + y^2}$ inside the cylinder $r = 2$.

3. Plot the vector field $\vec{F}(x, y) = 0.2\left(x^2 + y^2\right)\vec{i} + 0.2(x - y)\vec{j}$ using `meshgrid(-5:1:5,-5:1:5)`.

4. A piece of wire is in the shape of the circle $x^2 + y^2 = 1$. The density at any point is given by $\delta(x, y) = x^2 + y^4$. Find the mass of the wire.
   side information, not needed to answer the question: $\delta(x, y)$ could be in grams per cm in which case the mass would be grams.

5. Evaluate the line integral $\int_C x + y\, ds$ where *C* is the straight line segment from (0, 1, 1) to (3, 2, 2).

6. Evaluate the line integral $\int_C yz\, dx + yz\, dy + y\, dz$ where *C* is the top half of $y^2 + z^2 = 4$ in the *yz*-plane traveling from left to right.

7. Suppose Σ is the portion of the plane $z = 10 - x - y$ inside the cylinder $x^2 + y^2 = 1$. The surface Σ is submerged in an electric field such that at any point the electric charge density is $\delta(x, y, z) = x^2 + y^2$. Find the total amount of electric charge on the surface.
   side information, not needed to answer the question: $\delta(x, y, z)$δ(x, y, z) could be in coulombs per cubic centimeter in which case the total charge would be in coulombs.

8. A fluid is flowing through space following the vector field $\vec{F}(x, y) = y\vec{i} - x\vec{j} + z\vec{k}$. A filter is in the shape of the portion of the paraboloid $z = x^2 + y^2$ with $0 \le x \le 3$ and $0 \le y \le 3$, oriented inwards (and upwards). Find the rate at which the fluid is moving through the filter.
   side information, not needed to answer the question: The fluid flow $\vec{F}$ could have units $g/(cm^2 s)$ in which case the total flow would be in grams per second.