Review of Material for Differential Geometry

Review **definitions, big picture ideas, visualizations, and examples**. During class we'll briefly review 2130 and 2240 concepts as they naturally arise in differential geometry over the course of the semester. Solidifying any material you aren't feeling comfortable with before and after we cover it will also help you solidify the related differential geometry concepts.

Ideas from the pre-requisite multivariable calculus: Calculus and Analytic Geometry III is a pre-requisite for the class, and we'll be building off the following topics, so it will be helpful to review to make sure you understand the concepts and know how to do a computational example.

1. equation of a line in 3-space
2. tangent line
3. equation of a plane
4. tangent plane
5. parametrizations of curves and surfaces
6. velocity and acceleration
7. speed
8. tangent vector
9. normal vector
10. tangential and normal components of acceleration
11. curvature
12. arc length
13. surface area
14. volume
15. cylindrical and spherical coordinates
16. derivative of a function of one variable whose range is in $\mathbb{R}^3$, i.e. (x(t), y(t), z(t))
17. partial derivatives of a multivariable function i.e. f(x,y)
18. multivariable chain rule
19. gradient
20. Green's Theorem
21. Stokes' Theorem
22. directional derivative
23. fundamental theorem of calculus
24. dot product
25. cross product
26. norm or length of a vector
27. derivative of dot product of two vectors

Ideas from co-requisite linear algebra: If you have taken Introduction to Linear already, it would be helpful to review the following concepts, and if not, it would be helpful to pay special attention as these concepts come up in 2240 and in differential geometry:

1. matrix notation a_{ij}
2. multiplication of matrices
3. inverse of a 2x2 matrix
4. addition of matrices
5. transpose of a matrix
6. determinant of a matrix
7. symmetric matrix
8. linear combination of vectors
9. span of vectors
10. basis of a space
11. dimension of a space
12. eigenvalue