Calculus III
Homework on Lecture 1

1. Find the distance between the points. The answer key has not been proofread, use with caution.

   (a) $(2, 3, 5)$ and $(3, 5, 7)$.

   answer: 3

   (b) $(1, 1, 1)$ and $(0, 0, -1)$.

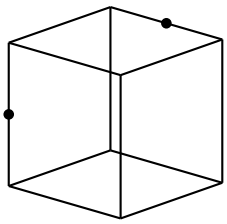
   answer: $\sqrt{6}$

   (c) A vertex of a cube with edge 2cm and the midpoint of one of the three opposing sides.

   answer: $\sqrt{6}$

   (d) Consider a cube with edge 2cm. Consider two edges that do not have a common point and are not parallel. Find the distance between the midpoints of those two edges.

   answer: $\sqrt{6}$



2. Show that the equation is an equation of a sphere. Determine the center of the sphere and its radius. The answer key has not been proofread, use with caution.

   (a) $x^2 + y^2 + z^2 - 2x + 3y + 5z = 0$

   answer: Sphere with center $(1, -\frac{3}{2}, -\frac{5}{2})$ and radius $\frac{\sqrt{38}}{2}$

   (b) $x^2 + y^2 + z^2 - x - 2y - 3z = 0$

   answer: Sphere with center $(\frac{1}{2}, 1, \frac{3}{2})$ and radius $\frac{\sqrt{14}}{2}$

   (c) $\frac{1}{2}\left((x-y)^2 + (x+y)^2\right) + z^2 + 2z = 0$

   answer: Sphere with center $(0, 0, -1)$ and radius 1