Written Homework 10

MATH 126

Solve each of the following problems. Work out your problems on scratch paper first, then write your solutions neatly on the pages you plan to turn in. Write the problems in assigned order, with each problem clearly labeled. Use words to clearly explain your work and methods. The reader should never have to guess or infer your intentions.

For a brief guide to writing homework solutions, see *Writing Mathematics Well* from Harvey Mudd College.

Scan or photograph your solutions and submit them (as a single file) to the Written Homework 10 assignment on Moodle. This assignment is due at classtime on **Friday, November 7**.

1. Describe in words the region of 3D space represented by each of the following. Then illustrate with a sketch.

(a) $z = 5$

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

(c) $x^2 + y^2 + z^2 \leq 1$

2. Find the *distance* from the point $(4, 16, 6)$ to each of the following. Include a rough sketch and an explanation.

(a) The xy-plane

(b) The yz-plane

(c) The x-axis

(d) The z-axis

3. For each of the following pairs of vectors $\mathbf{a}$ and $\mathbf{b}$, calculate $\mathbf{a} + \mathbf{b}$, $3\mathbf{a} + 2\mathbf{b}$, $|\mathbf{a}|$, and $|\mathbf{a} + \mathbf{b}|$.

(a) $\mathbf{a} = \langle 5, 3 \rangle$ and $\mathbf{b} = \langle -1, -2 \rangle$

(b) $\mathbf{a} = \langle 4, -3, 2 \rangle$ and $\mathbf{b} = \langle 2, 0, -4 \rangle$

4. Given the configuration of points shown below, write each of the following combination of vectors as a single vector.

(a) $\overrightarrow{AB} + \overrightarrow{BC}$

(b) $\overrightarrow{DC} + \overrightarrow{AB} + \overrightarrow{CA}$