

Vector Analysis Summer 2009
Homework Assignments

Homework 1, due Monday 18th May 2009

Read the first two chapters of Spiegel.

Prepare for the first quiz on Thursday May 14th.

Material for the first quiz: Chapters one and two of Spiegel.

Do the following problems from Spiegel second edition to be handed in for grading.

- Pages 17-19 Problems 33, 34, 35, 47, 50, 55, 58.
- Pages 39-41 Problems 62, 64, 66, 83.

The equivalent problems from Spiegel first edition are:

- Chapter one, Problems 33, 37, 38, 51, 56, 61, 64.
- Chapter two, Problems 62, 64, 66, 83.

Homework 2, due Tuesday 26th May 2009

Read the first three chapters of Spiegel.

Prepare for the second quiz on Thursday May 21st.

Material for the second quiz: up to and including chapter three of Spiegel.

Do the following homework problems:

Spiegel Chapter 3, pages 64, 65, second edition:

Questions 3.32, 3.34, 3.37, 3.41, 3.42.

Same questions in the first edition.

Also do the following five problems:

Question 1

Let a cable $ACDB$, ninety feet long hang from a horizontal ceiling, attached to the ceiling at points A and B , sixty feet apart.

Weights of 300 pounds are attached at the points C and D .

The parts AC , CD and DB of the cable are straight and each is thirty feet long.

Find the forces in the cables.

Ignore the weight of the cable and its thickness and assume that it stretches a negligible amount.

Question 2

A quadrilateral $ABCD$ in the plane has vertices at the points:

$A = (13, 16)$, $B = (4, -2)$, $C = (-4, -6)$ and $D = (-10, 7)$.

Sketch the quadrilateral and find its area.

Suppose now that the quadrilateral is made of material of uniform density 5 pounds weight per unit area.

Point weights of 100, 200, 300 and 400 pounds weight are attached to the quadrilateral at the points A , B , C and D .

Where is the center of mass of the system?

Question 3

A triangle ABC in the plane has vertices at the points $A = (12, 13)$, $B = (-12, -5)$ and $C = (-8, -7)$.

Let the line AP be perpendicular to BC and meet BC at the point P .
Let the line BQ be perpendicular to CA and meet CA at the point Q .
Let the line CR be perpendicular to AB and meet AB at the point R .

Prove that the three lines AP , BQ and CR meet at a point S and determine the four points P , Q , R and S .

Question 4

Let A , B , C and D be the points in space:

$$A = (3, 5, 2), B = (-5, -6, -4), C = (1, 8, -2), D = (-4, 4, -7).$$

Prove that the lines AB and CD intersect and find the point E of intersection. Show that the four points A , B , C and D are co-planar and find the equation of the plane containing these points.

Question 5

Let A , B , C and D be the points in space:

$$A = (3, 2, 0), B = (1, 4, -1), C = (4, 1, -3), D = (5, 6, -2).$$

Find the distance d between the lines AB and CD and find the point P on the line AB and the point Q on the line CD such that PQ has length d .

Homework 3, due Tuesday 3rd June 2009

Read the first five chapters of Spiegel.

Prepare for the exam on Thursday May 27th.

Material for the exam: up to and including chapter three of Spiegel.

Also do the following homework problems:

Spiegel Chapter 3, pages 64, 65, second edition:

Questions 3.47, 3.48, 3.68, 3.70.

Spiegel Chapter 4, pages 91-94, second edition:

Questions 4.45, 4.60, 4.67, 4.81, 4.93, 4.102.

Same questions in the first edition.

Homework 4, due Tuesday 9th June 2009

Read the first six chapters of Spiegel.

Prepare for the quiz on Thursday June 4th.

Material for the quiz: up to and including chapter five of Spiegel, no surface of volume integrals.

Also do the following homework problems:

Spiegel Chapter 5, pages 121- 123, second edition:

Questions 5.30, 5.31, 5.32, 5.37, 5.40, 5.43, 5.47, 5.51, 5.53, 5.56.

Homeworks 5/6, due Tuesday 16th June 2009

Read the first seven chapters of Spiegel.

Prepare for the quiz on Thursday June 11th.

Material for the quiz: up to and including chapter five of Spiegel.

Also do the following homework problems:

Spiegel Chapter 5, pages 123-124, second edition:

Questions 5.58, 5.59, 5.60, 5.65.

Spiegel Chapter 6, pages 154-156, second edition:

Questions 6.49, 6.58, 6.65, 6.68, 6.73, 6.74.

Spiegel Chapter 7, pages 183-184, second edition:

Questions 7.56, 7.57, 7.59, 7.75, 7.76.