

Homework 8, Due Monday, November 3, 2003

1. Let $\vec{v} = \langle -1, 7 \rangle$. Let $\vec{w} = \langle 2, x \rangle$, where x is a variable. For which values of x is the pair of vectors (\vec{v}, \vec{w})

i) linearly dependent?

ii) right handed?

iii) left handed?

2. Let $A = (1, 3)$, $B = (-2, 1)$, $C = (4, -7)$. *Without computing any lengths or angles*, find the area of triangle $\triangle ABC$.

3. In this exercise you will develop a formula for the area of a quadrilateral in the Cartesian plane. Let the four vertices of your quadrilateral be $A = (a, b)$, $B = (c, d)$, $C = (e, f)$, $O =$ the origin, $(0, 0)$, in that order, so \overline{BO} is one of the diagonals. (The general case where none of your points is O can be gotten from this one by selecting one of the points and subtracting it from everything.)

i) Get a formula for the area of the quadrilateral, by adding together the determinantal formulas for the two triangles $\triangle OAB$ and $\triangle OBC$. There should be two sets of absolute value signs in your formula.

ii) Get a formula for the area, using only one set of absolute value signs. Explain clearly why this works.

iii) Compute the area of the following quadrilateral using the formulas in parts i and ii and check your work using $1/2 \text{ base} \times \text{height}$.

$$A = (4, 0), B = (4, 3), C = \left(-\frac{16}{5}, \frac{63}{5}\right), O = (0, 0).$$