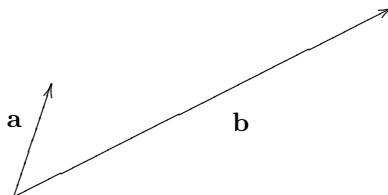


MATH 20A - HOMEWORK ONE

Because this homework was posted later than I hoped, it is under one-half the length of a regular homework, and carries only one-half the credit. It is due **Friday, Sept 4th**.

1. §9.2, question 6 parts (c),(e), and questions 15, 17, 19—at least in the 3rd edition! I've written the questions out in case they have changed in the 4th edition.

(a) Copy the vectors in the figure below, and use them to draw the following vectors: (i) $2\mathbf{a}$, (ii) $2\mathbf{a} + \mathbf{b}$.



- (b) Let $\mathbf{a} = \langle 5, -12 \rangle$, $\mathbf{b} = \langle -3, -6 \rangle$; find $\mathbf{a} + \mathbf{b}$, $2\mathbf{a} + 3\mathbf{b}$, $|\mathbf{a}|$ and $|\mathbf{a} - \mathbf{b}|$.
 (c) Let $\mathbf{a} = \mathbf{i} + 2\mathbf{j} - 3\mathbf{k}$, $\mathbf{b} = -2\mathbf{i} - \mathbf{j} + 5\mathbf{k}$; find $\mathbf{a} + \mathbf{b}$, $2\mathbf{a} + 3\mathbf{b}$, $|\mathbf{a}|$ and $|\mathbf{a} - \mathbf{b}|$.
 (d) Find a unit vector in the direction $8\mathbf{i} - \mathbf{j} + 4\mathbf{k}$
2. (a) Suppose we have points P and Q , and we have chosen a reference frame and an origin, so we can write down their coordinates:

$$P = (x, y, z) \text{ and } Q = (x', y', z')$$

and let us use the letter \mathbf{v} to denote the vector from P to Q . Write down the components of \mathbf{v} in the form $\langle \circ, \circ, \circ \rangle$. (So you should fill in the \circ s with formulas involving x, y, z, x', y' and z' .) Then write down a formula for the length of the vector \mathbf{v} as a formula involving x, y, z, x', y' and z' .

- (b) Explain how this can be used to calculate the distance between any two points, if we are given the coordinates for those points.
3. (§9.1, Q 2,7,8 of the 3rd edition; again, written out.)
- (a) Sketch the points $(0,5,2)$, $(4, 0, -1)$, $(2,4,6)$ and $(1,-1,2)$ on a single set of coordinate axes.
 (b) For each of the following triangles PQR , find the lengths of the sides. Is either a right angled triangle? An isosceles triangle?

triangle 1	$P(3, -2, -3)$,	$Q(7, 0, 1)$,	$R(1, 2, 1)$
triangle 2	$P(2, -1, 0)$,	$Q(4, 1, 1)$,	$R(4, -5, 4)$

- (c) Consider the point $P = (3, 7, -5)$; determine the distance from the point P to (i) the xy plane, (ii) the yz plane, (iii) the xz plane, (iv) the x axis, (v) the y axis, (vi) the z axis.