MT1612: EXAMPLE SHEET[1] VI (for April 28, 1999)

1.) Given the vectors $\mathbf{a} = (1, 2, 3)$, $\mathbf{b} = (3, 2, 1)$ and $\mathbf{c} = (1, 1, 2)$ find

(i) $4(\mathbf{a} + 3\mathbf{b}) - \mathbf{c}$

(ii) $|2(\mathbf{a} + 3\mathbf{c})|$

(iii) the unit vector $\mathbf{e_d}$ parallel to $\mathbf{d} = 3(\mathbf{b} - 2\mathbf{c})$.

2.) A weight is suspended from the asymmetrically arranged string shown in Fig. 1. The

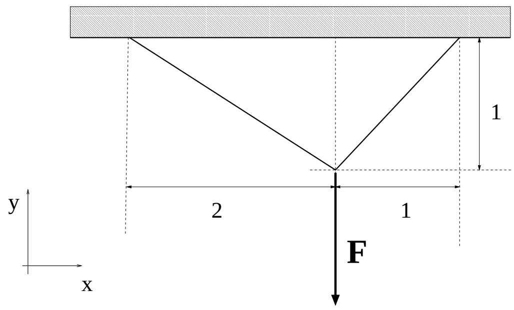

Figure 1: Sketch of a weight (represented by the force $\mathbf{F}$) suspended asymmetrically from a string.

weight can be represented by the force $\mathbf{F} = (0, -F)$ which acts vertically downwards.

(i) Work out the tensions T_1 and T_2 in the left and right parts of the string respectively. [Hint: A string can only support forces parallel to its centreline].

(ii) What is the total length of the string[2]?

3.) Show that the diagonals of a parallelogram bisect each other. [Hint: Let the parallelogram be 0ACB. Take the origin of the position vectors at 0 and let the position vectors of the vertices A and B be $\mathbf{a}$ and $\mathbf{b}$, respectively.]

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[2] At last the answer to the question: 'How long is a piece of string?'