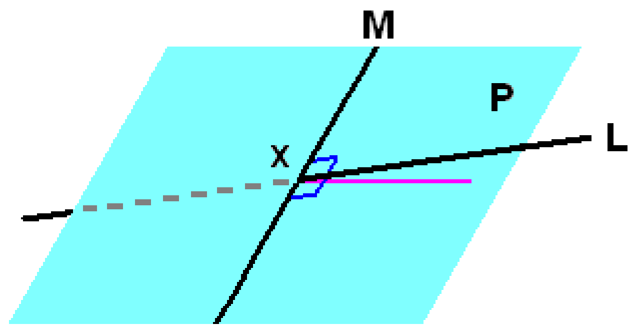
FIGURE FOR SOLUTIONS TO ADDITIONAL EXERCISES, SET D

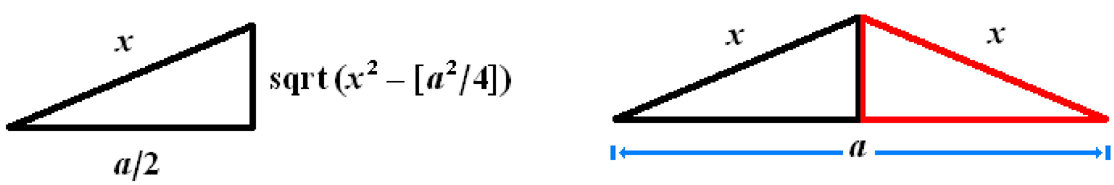
These exercises are posted in http://math.ucr.edu/~res/math133/perpexercises.pdf, and the written solutions are posted in http://math.ucr.edu/~res/math133/perpsolutions.pdf.

D3.



The idea in the hint is to show that **M** is the intersection of **P** with the plane **Q** through **X** such that **L** $\perp$ **Q.** In the drawing the perpendicular projection of **L** onto the plane **P** is drawn in pink**.** Observe that this projection **N** is a line through **X** and **M** is also the line through **X** which is perpendicular to the plane of **L** and **N** (try to prove this assertion using vectors — it is not particularly difficult**!**)**.**

D4.



Since $2x > a$ it follows that $x^2 - [a^2/4]$ is positive and hence one can construct a right triangle whose sides have lengths a and $x^2 - [a^2/4]$**.** The hypotenuse of such a triangle must have length equal to x by the Pythagorean Theorem**.** The second drawing indicates what should happen if we take the mirror image of this triangle with respect to the line containing the side of length $x^2 - [a^2/4]$**.** In order to complete the proof it is necessary to give reasons why this picture is accurate and one obtains an isosceles triangle with the desired properties**.**