11.1 #4

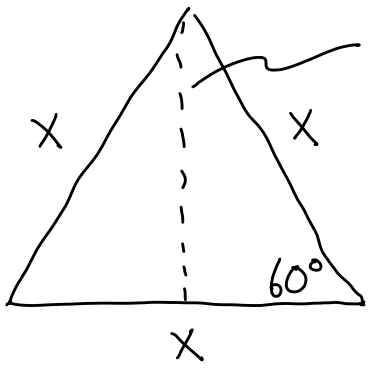
(a) $d_{AB} = \sqrt{(5-7)^2+(-2-0)^2+(-1-3)^2} = \sqrt{4+4+16} = \sqrt{24} = 2\sqrt{6}$

$d_{AC} = \sqrt{(5-9)^2+(-2+4)^2+(-1-1)^2} = \sqrt{16+4+4} = \sqrt{24} = 2\sqrt{6}$

$d_{BC} = \sqrt{(7-9)^2+(0+4)^2+(3-1)^2} = \sqrt{4+16+4} = \sqrt{24} = 2\sqrt{6}$

Since all three sides have the same length, the triangle is equilateral.

(b) If an equilateral triangle has side length x, what is its area?



height $= x \sin 60° = \frac{\sqrt{3}}{2}x$

$A = \frac{1}{2}(\text{base})(\text{height}) = \frac{1}{2}x\left(\frac{\sqrt{3}}{2}x\right) = \frac{\sqrt{3}}{4}x^2$

So from part (a), $A = \frac{\sqrt{3}}{4}(\sqrt{24})^2 = 6\sqrt{3}$