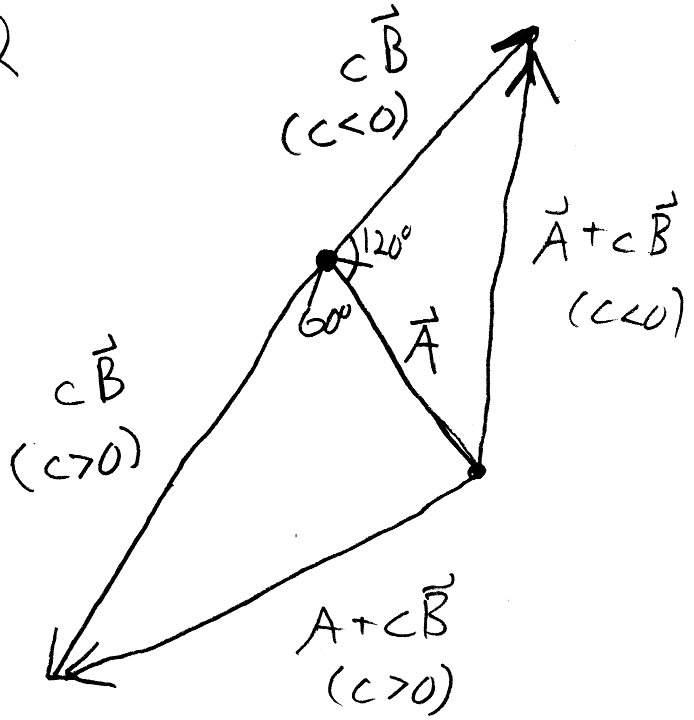
3-22



$|\vec{A}| = L$

$|\vec{A}+c\vec{B}| = 2.18L$

Find 2 values for c

$|c\vec{B}| = |c| \cdot L$

Length, not absolute value

Use Law of cosines

For $c<0$:

$$(|\vec{A}+c\vec{B}|)^2 = (|\vec{A}|)^2 + (|c\vec{B}|)^2 - 2|\vec{A}|\cdot|c\vec{B}|\cos 120°$$

$$(2.18)^2 L^2 = L^2 + c^2L^2 - 2\cdot L^2\cdot(-c)\cdot\left(-\tfrac{1}{2}\right)$$

$$(2.18)^2 L^2 = L^2 + c^2L^2 - cL^2$$

$$c^2 - c - 3.75 = 0$$

For $c>0$:

$$(|\vec{A}+c\vec{B}|)^2 = (|\vec{A}|)^2 + (|c\vec{B}|)^2 \underbrace{- 2|\vec{A}||c\vec{B}|\cos 60°}_{-2\cdot L^2\cdot c\cdot\frac{1}{2} \,=\, -cL^2}$$

→ gives same eqn as for $c<0$

$c^2 - c - 3.75 = 0$ Use quadratic eqn $c = \dfrac{-b \pm \sqrt{b^2-4AC}}{2A}$

$$c = \frac{1 \pm \sqrt{1^2 - 4\cdot 1\cdot(-3.75)}}{2}$$

$c = 2.50$

$c = -1.50$