1 | boatman problem

Target displacement: (3km, 2km)

We are working with the velocities of the boat and the river. The velocity of the river is defined as $r = \langle 0, -3.5 \rangle$. We want to find vector $v = \langle v_x, v_y \rangle$ s.t.

$$|v|=13$$
 km/h
$$\lambda(v+r)=\langle 3,2 \rangle$$

Where the trip will take λ hours

$$v_x^2 + v_y^2 = 13^2$$

$$\lambda(v_x + 0) = 3$$

$$\lambda(v_y + -3.5) = 2$$

$$v_x = \frac{3}{\lambda}$$

$$v_y = \frac{2}{\lambda} + 3.5$$

$$\frac{3^2}{\lambda^2} + \left(\frac{2}{\lambda} + 3.5\right)^2 = 13^2$$

$$\frac{3^2}{\lambda^2} + \frac{2^2}{\lambda^2} + 3.5^2 + \frac{4(3.5)}{\lambda} = 13^2$$

$$\frac{3^2 + 2^2}{\lambda^2} + \frac{4(3.5)}{\lambda} = 13^2 - 3.5^2$$

$$3^2 + 2^2 + 4(3.5)\lambda = \lambda^2 \left(13^2 - 3.5^2\right)$$

$$13 + 4(3.5)\lambda = \lambda^2 \left(156.75\right)$$

$$-156.75\lambda^2 + 14^2 + 13 = 0$$

$$-14 \pm \sqrt{14^2 + 4(13)156.75}$$

$$-2(156.75)$$

$$-14 + \sqrt{14^2 + 4(13)156.75}$$

$$-2(156.75)$$

$$= -0.24676847741$$

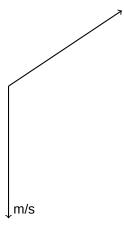
$$-14 - \sqrt{14^2 + 4(13)156.75}$$

$$-2(156.75)$$

$$= 0.336082671987$$

Maybe it's time to do it geometrically

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