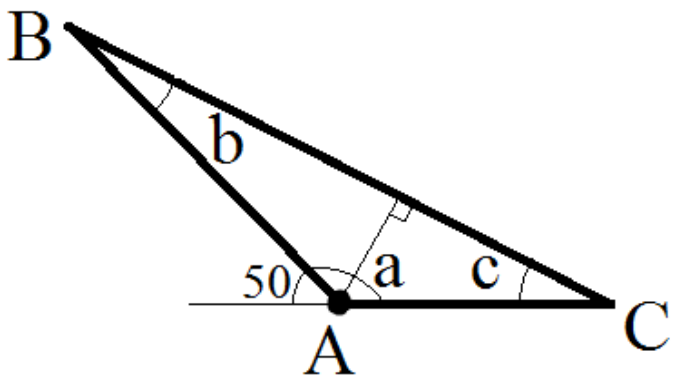
A ship leaves the island of Guam and sails a distance 290 Km at an angle 50.0 north of west. In which direction must it now head so that its resultant displacement will be 105 Km directly east of Guam? (Express your answer as an angle measured south of east)



$a = 180° - 50° = 130°$

$AB = 290km$

$AC = 105km$

From the law of cosines for BC:

$$BC = \sqrt{AB^2 + AC^2 - 2 * AB * AC * \cos(a)}$$

From the law of cosines for AB:

$$AB^2 = BC^2 + AC^2 - 2 * BC * AC * \cos(c)$$

$$\cos(c) = \frac{BC^2 + AC^2 - AB^2}{2 * BC * AC}$$

Using equation for BC:

$$\cos(c) = \frac{AB^2 + AC^2 - 2 * AB * AC * \cos(a) + AC^2 - AB^2}{2 * AC * \sqrt{AB^2 + AC^2 - 2 * AB * AC * \cos(a)}}$$

$$\cos(c) = \frac{2 * AC^2 - 2 * AB * AC * \cos(a)}{2 * AC * \sqrt{AB^2 + AC^2 - 2 * AB * AC * \cos(a)}}$$

$$\cos(c) = \frac{2 * 105^2 - 2 * 290 * 105 * \cos(130)}{2 * 105 * \sqrt{290^2 + 105^2 - 2 * 290 * 105 * \cos(130)}} \cong 0.795$$

$$c \cong 37.3°$$

Answer: $c \cong 37.3°$