Section 6.5
Solutions and Hints

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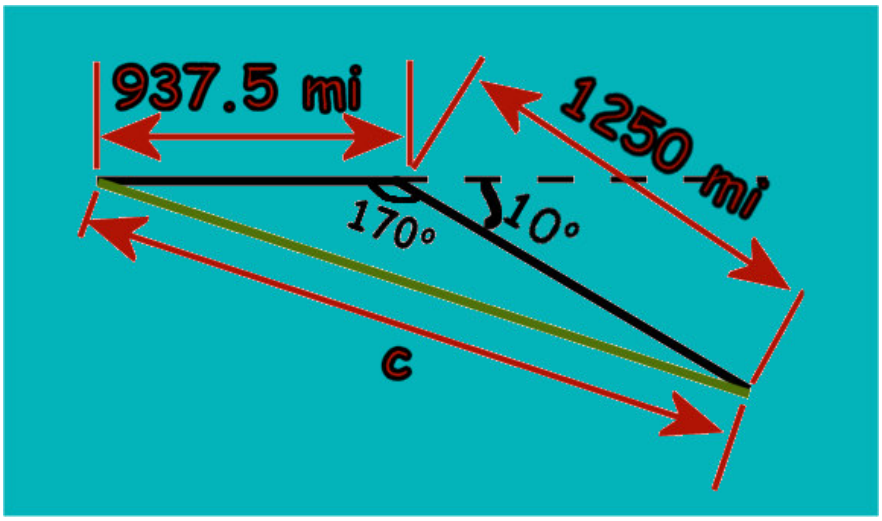
for the book:

Precalculus, Mathematics for Calculus 4th Edition
by James Stewart, Lothar Redlin and Saleem Watson.

31. A pilot flies in a straight path for 1 hour and 30 minutes. She then makes a course correction heading 10° to the right of her original course and flies 2 hours in the new direction. If she maintains a constant speed of 625 miles per hour, how far is she from her original position?

First notice the distance she flew in the original direction = 625 * 1.5 = 937.5 miles.
The distance along the altered course = 625 * 2 = 1250 miles.
This would result in a picture as follows:



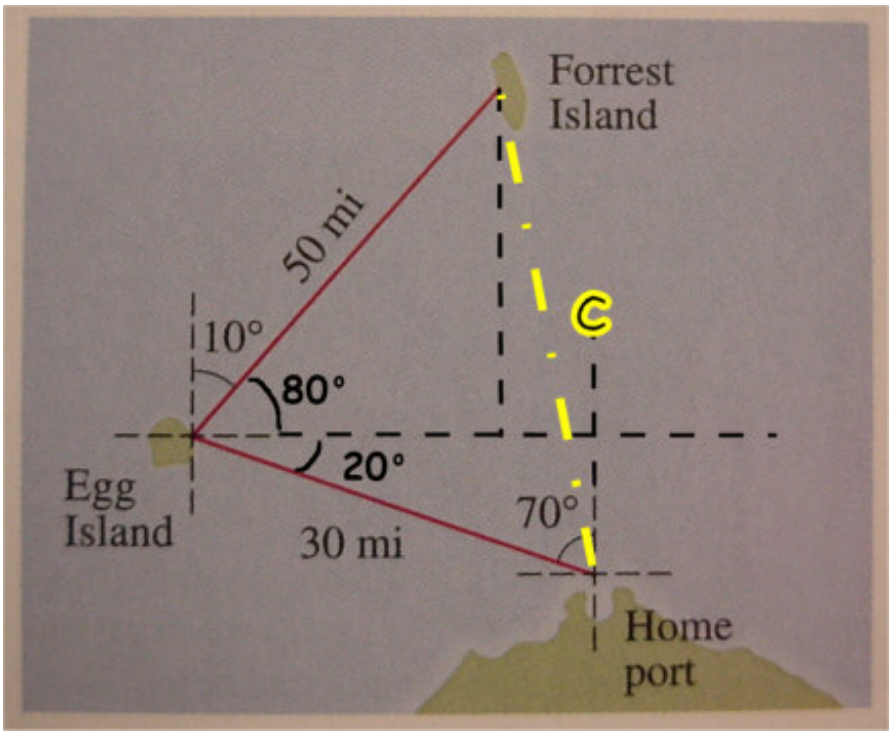
To find c we simply apply the Law of Cosines:

$c^2 = a^2 + b^2 - 2ab*\cos(C)$, with a = 937.5, b = 1250 and C = 170°

$c^2 = (937.5)^2 + (1250)^2 - 2*937.5*1250*\cos(170°)$
$c^2 \cong 4\ 749\ 549.421$
$c \cong$ **2179.34 miles**

33. A fisherman leaves his home port and heads in the direction N 70° W. He travels 30 miles and reaches Egg Island. The next day he sails N 10° E for 50 miles and reaches Forrest Island.

33a. Find the distance between the fisherman's home port and Forrest Island.



Notice we filled in the 20° by the sum of the degrees in a triangle = 180°.
So we went $\alpha = 180 - (70 + 90) = 20°$
And we filled in the 80° because $\beta = 90 - 10 = 80°$.

Thus $\angle C = 80 + 20 = 100°$, $a = 30$ miles, $b = 50$ miles
and we apply the Law of Cosines:

$c^2 = a^2 + b^2 - 2ab*\cos(C)$
$c^2 = 30^2 + 50^2 - 2*30*50*\cos(100°)$
$c^2 \cong 3920.944533$ miles
$c \cong$ **62.617 miles**

33b. Find the bearing from Forrest Island back to his home port.

This can be done several ways. Using the Law of Sines:
$\sin(100°)/62.617 = \sin(A)/30 \rightarrow \sin^{-1}(30* \sin(100°)/62.617) = A$
$\rightarrow A \cong 28.16°$

Note to complete out the triangle with hypotenuse = 50 miles the angles are: 90°, 80° and 10°. Thus 10° of that 28.16 is "used up" and we arrive at the heading of: **S 18.16° E**