Math 112 (Sec 9.7)

Sailboat/Freighter Simulation Using Parametric Mode

Problem:

A sailboat traveling at 9 $\frac{mi.}{hr.}$ N 70° E starting at coordinates (25, 5) miles passes "near" a freighter. The ship moves at 11 $\frac{mi.}{hr.}$ S 20° W starting from coordinates (80 mi., 60 mi.)

How close do they come to each other? At what time does this occur?

Solution: Recall, distance = (rate)(time)

We separate x movement from y movement and use time, t, in hours as our independent parameter.

Sailboat: $x_1 = 25 + 9(\cos 20°)t$

$y_1 = 5 + 9(\sin 20°)t$

Freighter: $x_2 = 80 + 11(\cos 250°)t$

$y_2 = 60 + 11(\sin 250°)t$

$t_{min} = 0$

$t_{max} = 5.5$ hours

$t_{step} = 0.1$ hour

$X_{min} = 0$

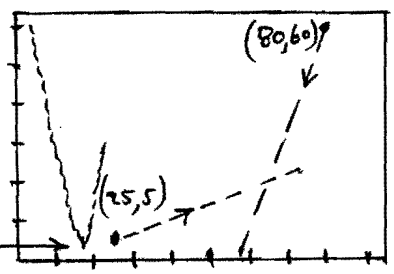
$X_{max} = 94$

$X_{scl} = 10$

$Y_{min} = 0$

$Y_{max} = 62$

$Y_{scl} = 10$



Distance between the boats can be displayed using the distance formula:

$X_3 = 4t$ ("spreads" out the sketch)

$Y_3 = \sqrt{((X_{2T} - X_{1T})^2 + (Y_{2T} - Y_{1T})^2)}$

Using Trace @ 4.3 hr. the boats are ≈ 3.64 mi. apart.