Project 1 Written Solution

COSC 071
Fall 2001

Algebraic Solution for Data Set 1

Length from Clew to Head: \(\sqrt{380^2 + 160^2} = 412.31\)
Sail area: \((0.5)(380)(160) + (8)(412.31) = 33698.48\)
Yards of Dacron: \[\frac{33698.48}{36/36}\] = 27
Dacron Cost: \((27)(7.75) = \$209.25\)
Sewing Costs: \((33698.48/36/36)(1.25) = \$32.50\)
Mounting Points: \((380 + 160)/12 = 45\)
Reefing Points: \((2)(160/24 - 1) = 10\)
Mounting Costs: \((45)(2.50) = \$112.50\)
Reefing Costs: \((10)(0.3) = \$3.00\)
Subtotal: \(209.25 + 32.50 + 112.50 + 3.00 = \$357.25\)
Tax: \((357.25)(0.065) = \$23.22\)
Total: \(357.25 + 23.22 = 380.47\)

Algorithm

INPUT luffLength, footLength, roachLength, reefingPoints, DacronCost
CALCULATE clewToHeadLength = \sqrt{luffLength^2 + footLength^2}
CALCULATE sailArea = 0.5 * luffLength * footLength + clewToHeadLength * roachLength
CALCULATE yardsDacronNeeded = \([\text{sailArea} / 36 / 36]\)
CALCULATE DacronCost = yardsDacronNeeded * DacronCost
CALCULATE sewingCosts = sailArea / 36 / 36 * 1.25
CALCULATE numberMountingPoints = (luffLength + footLength) / 12
CALCULATE mountingCosts = numberMountingPoints * 2.50
DECISION if (reefingPoints > 0)
    CALCULATE numberReefingPoints = reefingPoints * (footLength / 24 - 1)
    CALCULATE reefingCosts = numberReefingPoints * 0.30
CALCULATE subtotal = DacronCost + sewingCosts + mountingCosts
DECISION if (reefingPoints > 0)
    CALCULATE subtotal = subtotal + reefingCosts
CALCULATE tax = subtotal * 0.065
CALCULATE total = subtotal + tax
OUTPUT yardsDacronNeeded, sewingCosts
OUTPUT numberMountingPoints, mountingCosts
DECISION if (reefingPoints > 0)
    OUTPUT numberReefingPoints, reefingCosts
OUTPUT subtotal, tax, total