Financial Mathematics
Planimeters

0043-1. A mis-designed planimeter has its wheel at $45°$ to the second leg, rather than perpendicular. (See the next slide for a diagram, and note that the legs both have length 5, not 10.) Recompute the form ω that describes the rate of turning of the wheel, following this new (erroneous) design.

Let C be the circle of radius 10 about the fixed pin, with the parametrization that completes one revolution around C at a constant speed of 20π.

Compute $\int_C \omega$.

wheel; always at 45° to second leg

ϕ varies in time

ϕ

45°

second leg length=5

stylus; traces the curve

fixed; pinned down to the drawing board

length=5 first leg

hinge; pivots & swings

How can we find the area enclosed?