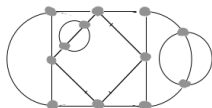# Fishing nets

▶ The Euler–Poincaré theorem for *any* convex 3d polyhedron with C corners, E edges and F faces is $C - E + F = 2$.

A random 2d fishing net is made from R identical ropes joined by K identical knots, such that there are H holes. The *total* underwater weight W (in Newtons) of the net containing one dead fish is $W = 4H - 2R$. What are the submerged weights of any rope, any knot, and the fish?

$R = 22$
$K = 12$
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▶ You just obtained the formula $W = 2R - 4K + 4$. Now you discover that each knot connects k ropes. The net is positioned by G guide ropes with free ends, whose weights are neglected. Find k such that for given G, a sufficiently complicated net always sinks with the fish.

$R = 22$
$K = 12$
$H = 11$
$G = 4$
$k = 4$