


Noughts And Crosses, Orbits And Stabilizers by Adi Cox 16th September 2005

$G = \{ r(0), r(\pi/2), r(\pi), r(3\pi/2), q(0), q(\pi/4), q(\pi/2), q(3\pi/4) \}$ where q is the vertical line through the center.

Looking at noughts and crosses where crosses win, so there will be five crosses and four noughts in a 3 x 3 matrix. There will be 5 from 9 combinations:

$$(9!)/((9-5)!5!) = (9 \times 8 \times 7 \times 6)/(4 \times 3 \times 2) = 2024/24 = 126$$

orb01  = {  }	stab01  = { r0, r90, r180, r270, q0, q45, q90, q135 }
orb02  = {  }	stab02  = { r0, r90, r180, r270, q0, q45, q90, q135 }
orb03  = {     }	stab03  = { r0, r180 }
orb04  = {     }	stab04  = { r0, q0 }
orb05  = {     }	stab05  = { r0, q0 }
orb06  = {     }	stab06  = { r0, q0 }
orb07  = {     }	stab07  = { r0, q0 }
orb08  = {     }	stab08  = { r0, q0 }
orb09  = {     }	stab09  = { r0, q45 }
orb10  = {     }	stab10  = { r0, q45 }
orb11  = {     }	stab11  = { r0, q45 }
orb12  = {     }	stab12  = { r0, q45 }
orb13  = {     }	stab13  = { r0, q45 }
orb14  = {          }	stab14  = { r0 }
orb15  = {          }	stab15  = { r0 }
orb16  = {          }	stab16  = { r0 }
orb17  = {          }	stab17  = { r0 }
orb18  = {          }	stab18  = { r0 }
orb19  = {          }	stab19  = { r0 }
orb20  = {          }	stab20  = { r0 }
orb21  = {          }	stab21  = { r0 }
orb22  = {          }	stab22  = { r0 }
orb23  = {          }	stab23  = { r0 }

There are 24 possibilities out of 126 games where noughts and crosses draw. So we have $126 - 24 = 102$ different ways for crosses to win a complete game.

