

Travels with Euler

“An assortment of predicaments”



George the 1st



George the 2nd



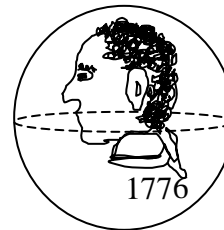
Euler



Euler Jr.



Old Abe



Euler's Sphere

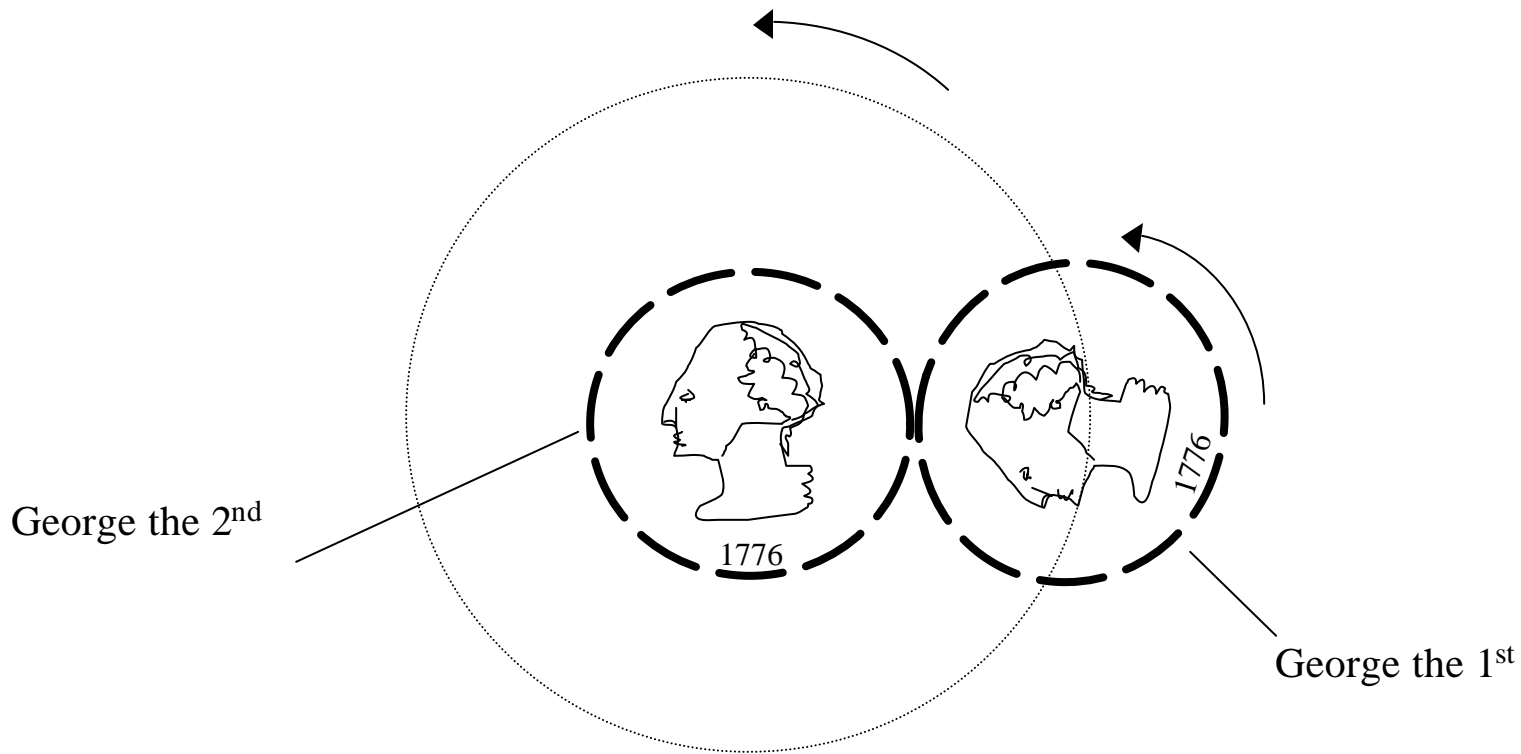
These problems explore vector addition (of angular rates) and apparent rotation

J J Bendik 2003

Rolling Coin Problem I

1970's SAT

How many times does “George the 1st” rotate around after he rolls around “George the 2nd” one time?

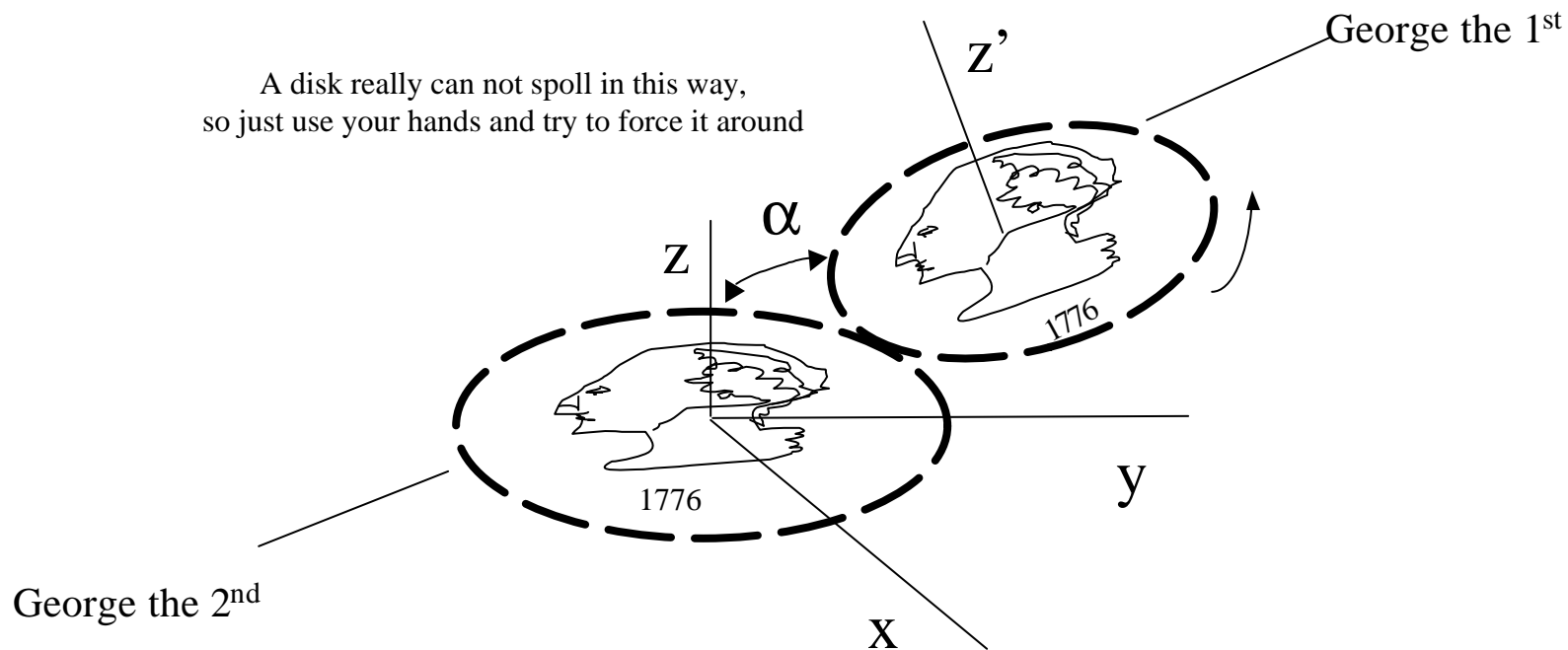


Where; the radius of “George the 1st” = radius of “George the 2nd”

Rolling Coin Problem II

Now, just how many times does “George the 1st” *appear* to rotate around after he rolls around “George the 2nd” one time?

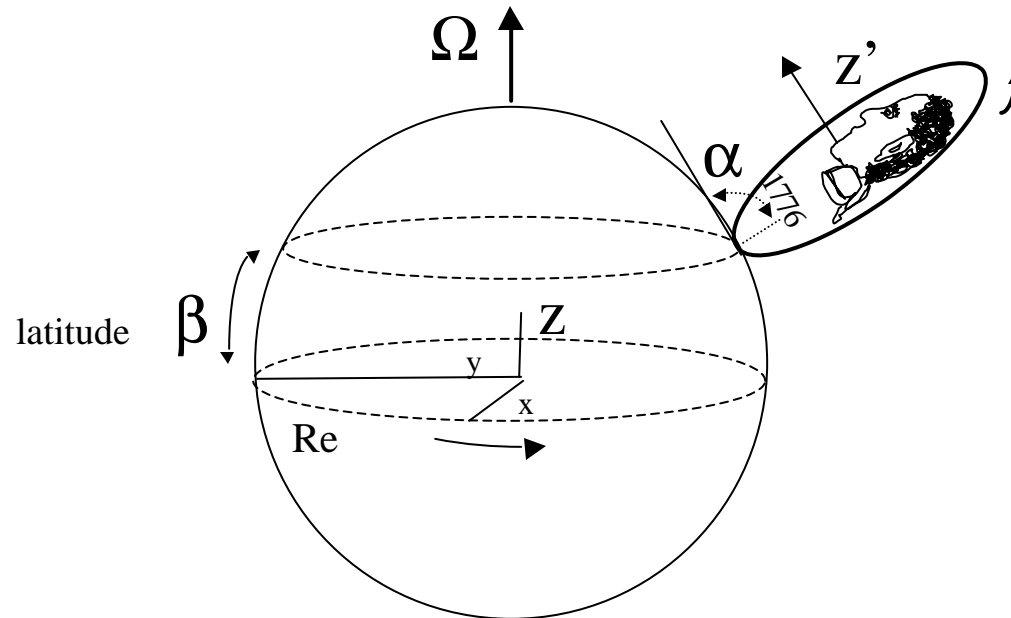
Consider cases where $\alpha \geq \pi/2$. After this, calculate the angular change about z' during one full roll around George the 2nd.



Where; the radius of “George the 1st” = radius of “George the 2nd”
and $\pi/2 < \alpha < \pi$ (z' is perpendicular to the face of George the 1st)

Rolling Coin Problem III

Now lets expand our understanding. How many times does “Euler” appear to rotate around after rolling around the earth one time along the upper parallel - the earth rotates at Ω



Where; the Earth radius (R_e) $>$ Euler radius (E)

Try a few different angles for $\alpha \geq \pi/2$