i) Given that cos(x+30)=3cos(x-30), prove that tanx= - root 3/ 2

Solution: $\cos(x+30)=3\cos(x-30)\Leftrightarrow cosx\cdot cos30-sinx\cdot sin30=3(cosx\cdot cos30+sinx\cdot sin30)\Leftrightarrow$ $\frac{\sqrt{3}}{2}cosx-\frac{1}{2}sinx=\frac{3\sqrt{3}}{2}cosx+\frac{3}{2}sinx\Leftrightarrow\sqrt{3}cosx=-2\sin x\Leftrightarrow tanx=\frac{-\sqrt{3}}{2}.$

(ii)prove that 1-cos2x/sin2x = tan x

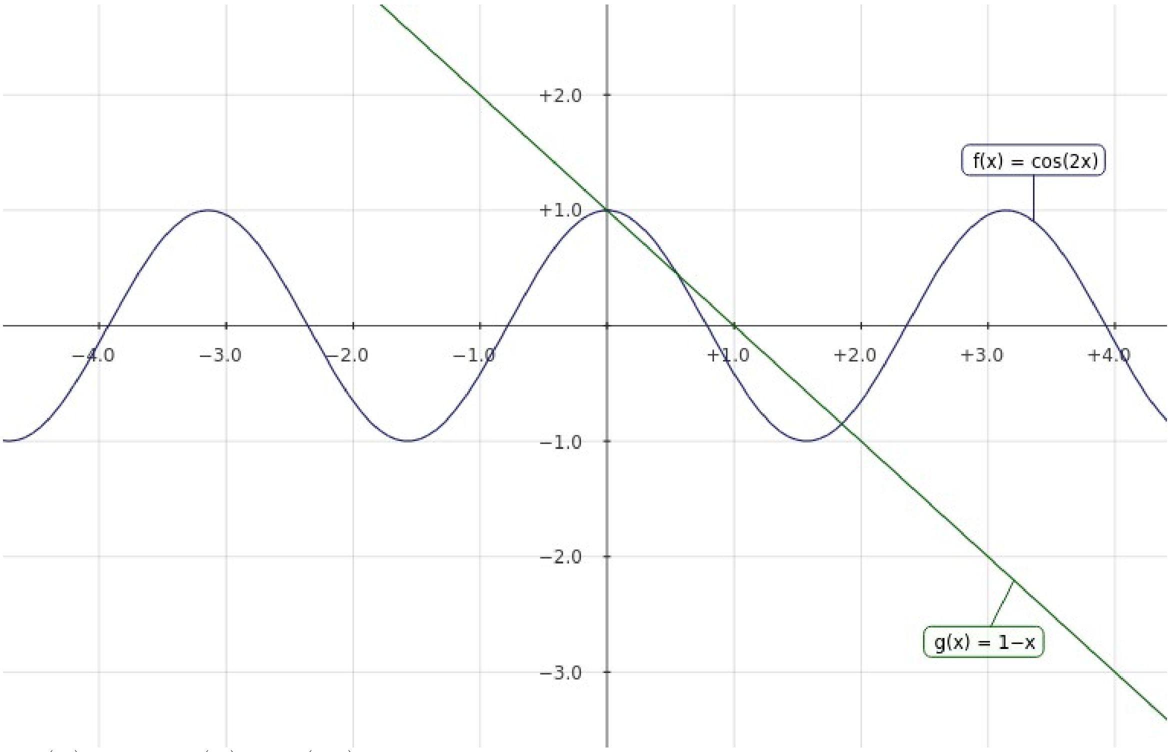
Solution: $\frac{1-cos2x}{sin2x}=\frac{1-1-2\sin^2 x}{2\sin x\cos x}=\frac{sinx}{cosx}=tanx$

(iii) verify that x= 180 is a solution of the equation 2x=2-2cos2x

Solution: $x=180^{\circ}=\pi, 2x=2-2\cos 2x\Leftrightarrow x=1-cos2x\Leftrightarrow\pi=1-\cos(2\pi)\Leftrightarrow\pi=1-1=0\Leftrightarrow\pi\neq 0$

(iv) Using the resulat from part (ii) or otherwise find the two other solutions 0<x<360 of the equation 2x= 2-2cos2x

Solution: $2x=2-2\cos 2x\Leftrightarrow x=1-cos2x, \frac{1-cos2x}{sin2x}=tanx\Leftrightarrow\frac{x}{sin2x}=tanx$



$g(x)=1-x, f(x)=\cos(2x), 0^{\circ}<x<360^{\circ}$, that's why there are 2 solutions.