## 26-10-2024 STEP Practice: Problem 11 (2005.01.04)

The Compound Angle Formula JinA = QR LOJA = TS \* = 90° - A < POS = A+B I in 13 = SR  $tin(A+B) = \frac{Opp.}{hyp.} = \frac{SP}{OS}$ COXB = OR = PT + TS = PT + TS = QR + TS05 = ORxinA + SRcosA = OS cosB sinA + OS sinB cosA ... In(A+B) = sin A cosB + cosA sinB fin (-0) = - fin 0 60 + (A+B) = co+ A cox B - fin A sin B (01 (-0) = 601 B tan(-0) = -tan0 · colAcosB => ten(A+R) = fin(A+B) = finAcosB + cosAsinB cos(A+B) cosA cosB - finA sin B LOFA COS B . . tun (A+B) = ten A + ten B 1 - tan Atan B

$$ms rin(A-B) = sinA(os(-B) + cosAsin(-B)$$

$$= sinA(osB - cosAsinB$$

$$tun(A-B) = tun A + tun(-B)$$

$$1 + tun A tun(-B)$$

$$= tun A - tun B$$

$$1 - tun A tun B$$

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fin(20) = fin(0+0) = find cor0 + cor0 + in0
                          = 21in0 w10
(03(20) = 601(0+0) = 60106010 - Jindjin 0
                         = 60120 - 1in20
tun (20) = tun (0+0) = tun 0 + tun 0
                              1-ton ton0
                          = 2 tun 0
                             1 - Eun 2 0
eio = coso + isino (Fulerí Formula)
~> fin 0 = Im (eio)
fin(\theta + \varphi) = fm(e^{i[\theta + \varphi]})
            = Im (eigeig)
             = Jm [[coj 0 + ipin 0][coj 4 + ipin 4])
            = Im ( 607 0 607 4 + 2 60 1 0 2 0 1 4 + 1 2 in 0 607 4 - 2 in 0 607 4)
            = fin 8 6084 + 6088 Fin 4 9.F.D.
mo 60+0 = Re (eig)
~> (0)(0+4) = Re(ei[0+4])
               = Re(w+0624+i620+in4+irin0624-rin0644)
               = lost 0 tos 4 - sint sin 4 Q.E.D.
1 = 601 20 + 1 in 20
Cof 2 = 1- 2 in 20
~ (val(20) = 1- 1in20 - Jin20
        = 1-21in20
Jin 20 = 1 - Coz 20
~> 62 (20) = 6220 -1+ 60220
      = 200120-1
The formulae which allow is to convert between trig functions that are squered and those of double englis are very execut for trig integrals.
Fig. \int_{-2}^{\frac{\pi}{2}} \sin^2\theta \, d\theta = \int_{-2}^{\frac{\pi}{2}} \frac{1 - \cos(2\theta)}{2} \, d\theta = \frac{\pi}{4}
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(b) 
$$(o_10 = \frac{1}{5}, \frac{1}{2} = 0 = 27)$$
 $(i_1(20) = 2 + i_1 \theta c_0 + 0$ 
 $= 2 \cdot \frac{1}{5} \cdot \frac{1}{5}$ 
 $1i_1(20) = -\frac{24}{2.5}$ 
 $1i_1(20) = -\frac{24}{2.5}$ 
 $(o_1(30) = (o_1(0) + 20) = (o_1(0) - o_1(0) + o_1(20))$ 
 $= (o_1(0) (o_1(0) - o_1(0)) - o_1(0) + o_1(0))$ 
 $= \frac{1}{5} \left[ (\frac{1}{5})^2 \cdot \frac{1}{15} \right] - (\frac{1}{15}) \left[ (\frac{1}{5})^2 \right]$ 
 $= \frac{1}{5} \left[ (\frac{1}{5})^2 \cdot \frac{1}{15} \right] - \frac{1}{15}$ 
 $= \frac{1}{5} \cdot \frac{1}{115} - \frac{1}{115}$ 
 $= \frac{1}{125}$ 

b)  $ton(30) = ton(0 + 20) = ton0 + ton(10) = ton0 + \frac{1 ton0}{1 - ton0}$ 
 $= (1 - ton0) ton0 + 2 ton0$ 
 $= (1 - ton0) ton0 + 2 ton0$ 
 $= ton0 - ton^20 + 2 ton0$ 
 $= 3 ton0 - ton^20$ 
 $= 3 ton0 - ton^20$ 
 $= 1 - 3 ton^20$ 
 $ton(30) = \frac{1}{12} \cdot \frac{1}{12} \cdot \frac{1}{12} = 0 = \frac{11}{2}$ 
 $= \frac{1}{12} \cdot \frac{1}{12} \cdot \frac{1}{12} = 0 = \frac{11}{2}$ 
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2ton 30 - 33ton 20 - 6ton 0 + 11 = 0 het a:= ton 0

~> f(w) = (2n-1)(au2+bu+c) (Factor Theorem)

het  $J(u) := 2u^2 - 33u^2 - 6u + 11$  u = 1 -22 - b = -6

-22u - bu = -bu

c = -11  $-b = 18 \Rightarrow b = -16$ 

 $2u^3 - 33u^2 - 6u + 11 = 0$ 

= (2u-1)(u2-16u-11)

a (言) = 0

$u = \frac{1}{2}, u =$	16 ± 1/62 + 44	=	8 ± 5√3
Ź	2		

五日三年。

1 = tano = 00

½<1, P-5√3 <1

. . Em 0 = 8+5 v3