= Exercise 5-2 Q1 (ii) Sin 75 = Sin (30+45)11 11 11 $Sin (30+45) = Sin 30 \cos 45 + \cos 30 \sin 45 \\ = (\frac{1}{2})(\frac{1}{\sqrt{2}}) + (\frac{\sqrt{3}}{2})(\frac{1}{\sqrt{2}})$ $= \frac{1}{2\sqrt{2}} + \frac{\sqrt{3}}{2\sqrt{2}}$ 7 Ę $= \frac{2J\bar{z} + 2J\bar{6}}{8} = \frac{J\bar{z} + J\bar{6}}{4}$ 02(i) Tan 15 = Tan (45-30) $T_{an}(45-30) = T_{an}45 - T_{an}30$ - $= \frac{1 - \frac{1}{\sqrt{3}}}{1 + (1)(\frac{1}{\sqrt{3}})} = \frac{1 - \frac{1}{\sqrt{3}}}{1 + \frac{1}{\sqrt{5}}} \qquad (mult each \\ by \sqrt{3} \end{pmatrix}$ $= \frac{\sqrt{3} - 1}{\sqrt{3} + 1}$ $\frac{\sqrt{3}-1}{\sqrt{2}+1} \times \frac{\sqrt{3}-1}{\sqrt{2}-1}$ 14 . 14 $= \frac{3 - 2\sqrt{3} + 1}{3 - 1} = \frac{4 - 2\sqrt{3}}{2}$ = 2-13

@3 opp 3 12 Sin A = 3/5 Sin B = 5/13 Cos A = 4/5 (osB = 12/13 Tan A = 3/4 Tun B = 5/12. $(i) \ Cos(A+B) = Cos A Cos B - Sin A Sin B.$ (4/5) (13/13) - (3/5) (5/13) $\frac{48}{65} - \frac{3}{13} = \frac{48 - 15}{65} = \frac{33}{65}$ (ii) Tan(A-B) = Tan A - Tan B1 + Tan A Tan B $= \frac{3/_{4} - 5/_{12}}{1 + (3'_{4})(5/_{2})} = \frac{\frac{9-5}{12}}{1 + 5/_{16}} = \frac{1/_{3}}{21/_{16}}$ $=\frac{1}{3} \times \frac{16}{21} = \frac{16}{63}$

1 $-O_{4}(i) \sin 45 \cos 15 + \cos 45 \sin 15.$ = $\sin (45 + 15) = \sin 60 = \frac{\sqrt{3}}{2}.$ $\frac{T_{an} 25 + T_{an} 20}{1 - T_{an} 25 T_{an} 20} = T_{an} \left(25 + 20\right)$ (iv) = Tan 45 = 1 $\frac{O5}{\frac{Tan 2H + Tan A}{1 - Tan 2A Tan H}} = Tan (2A + A) = Tan 3A.$ $O_{6}(i) \quad Sin(90^{\circ} - A) = Cos A$ $Sin(90-A) = Sin 90\cos A - \cos 90 \sin A.$ = (1) los A - (0) Sin A = los A. OF Tan (A-B) = 2 Tan B = 14 find Tan H Tan A -Tan B = 2 I + Tan A Tan B $7 \tan H - \frac{1}{2} \tan H = 2 + \frac{1}{4}$ $\frac{1}{2} \tan H = \frac{9}{4}$ $Tan A = \frac{18}{4}$ $Tan A = \frac{9}{2}$ $\frac{Tan A - \frac{1}{4}}{1 + Tan H(\frac{1}{4})} = 2.$ $\begin{array}{c}
 Tan A - \frac{1}{4} = 2\left(1 + \frac{1}{4} Tan A\right) \\
 Tan A - \frac{1}{4} = 2 + \frac{1}{2} Tan A
\end{array}$

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Tan B= 3 find (A+B) - 08 Tan A = 12 $Tan(A+B) = \frac{Tan A + Tan B}{1 - Tun A Tan B}$ $T_{an} \left(A + B \right) = \frac{\binom{1}{2} + \binom{1}{3}}{1 - \binom{1}{4}\binom{1}{3}} = \frac{\frac{3+2}{6}}{1 - \frac{1}{6}} = \frac{\frac{5}{6}}{\frac{5}{6}} = 1$ $T_{an}(A+B) = 1$ (A+B) = Tun -1/1) A+B= 45° H $O_{1}^{g} T_{am}(A+B) = 1$ Tan A = 1/3 find Tan B $\frac{Tun H + Tun B}{1 - Tan H Tun B} = 1$ 13 + Tun B = 1 (1-13 Em B) Tan B + 1/3 Tan B = 1-1/3 4/3 Tan B = 2/3 Tan B = 3/3 × 3/4 = 1/2 Tan B = 1/2

- 0210 $Sin\left(x+\frac{\pi}{4}\right) = Sin x \cos \frac{\pi}{4} + \cos x \sin \frac{\pi}{4}$ $= \binom{1}{2} \binom{1}{\sqrt{2}} + \cos x \binom{1}{\sqrt{2}}$ $= \left(\frac{1}{2}\right)\left(\frac{1}{\sqrt{2}}\right) + \left(\cos\left(\frac{\pi}{6}\right)\frac{1}{\sqrt{2}}\right)$ $= \left(\frac{1}{2}\right)\left(\frac{1}{\sqrt{2}}\right) + \left(\frac{\sqrt{3}}{2}\right)\left(\frac{1}{\sqrt{2}}\right)$ $=\frac{1}{2\sqrt{2}}+\frac{\sqrt{3}}{2\sqrt{2}}=\frac{1+\sqrt{3}}{2\sqrt{2}}$ $\begin{array}{ll} @ 11 \\ \hline Tan 15 &= Tan (45-30) = \frac{Tan 45 - Tan 30}{1 + Tan 45 Tan 30} \end{array}$ $= \frac{1 - \frac{1}{\sqrt{3}}}{1 + (1)(\frac{1}{\sqrt{3}})} = \frac{1 - \frac{1}{\sqrt{3}}}{1 + \frac{1}{\sqrt{5}}} \quad \text{mult each by } \sqrt{3}.$ $= \frac{\sqrt{3}-1}{\sqrt{3}+1} = \frac{\sqrt{3}-1}{\sqrt{3}+1} \times \frac{\sqrt{3}-1}{\sqrt{3}+1} = \frac{3-23}{3-1}$ $T_{an}^{2}(15) = \left(\frac{J_{3}-1}{\sqrt{3}+1}\right)^{2} = \left(2-J_{3}^{2}\right)^{2}$ 2 $= 4 - 4\sqrt{3} + 3$ = 7-4/3

 $T_{an}\left(\frac{TT}{4} + A\right) = \frac{\cos A + \sin A}{\cos A - \sin A}$ @12 $T_{un}\left(\frac{\pi}{4}+4\right) = \frac{T_{un}\frac{\pi}{4}+T_{un}H}{1-T_{un}T_{un}T_{un}} = \frac{1+T_{un}H}{1-(1)(T_{un}H)}$ $= \frac{1 + \frac{\sin 4}{\cos 4}}{1 - \frac{\sin 4}{\cos 4}}$ mult Each by Cost. $(\mathcal{R} \# s)$ = Cos A + SinA Cos A - SinA Cos(A+B) Cos B + Sin (A+B) Sin B = Cos A. @13 (Cos Alos B - Sin Asin B) Cos B + (Sin A Cos B + Los ASin B) Sin CosACosB - SinASinBCosB + SinACosBSinB + CosASinB Cost Cost B + Cost Sint B. T CosA (Cos²B + Sin²B) $\cos A(0) = \cos A$ (RHS)3

014 IT 3 $T_{an} A = \frac{2}{h} \qquad T_{an} B = \frac{3}{h}.$ $T_{an} (A+B) = \frac{T_{an} A + T_{an} B}{1 - T_{an} A T_{an} B}$ $T_{an} (45) = 1 = \frac{3/h}{1 - \binom{3/h}{2}}$ $| = \frac{\frac{35}{h}}{1 - \frac{6}{h^2}}$ $1 - \frac{6}{h^2} = \frac{5}{h} (x h^2)$ $h^{2}-6 = 5h$ $h^{2}-5h-6 = 0$ (h - 6)(h + 1) = 0 $h = 6 \qquad h = -1$ h=6

E F Sin A = Sin(A+30) Show $Tan A = 2+J_3$ 015 4 Sin(A+30) = Sin A Cos 30 + Cos A Sin 30Sin A = Sin A $\begin{pmatrix} V_{3} \\ \end{pmatrix}$ + $Cos A \begin{pmatrix} L_{3} \\ \end{pmatrix}$ Tant = Sint Cost E F $Sin A - \frac{\sqrt{3}}{3}Sin A = \frac{1}{2}Cos A \qquad (x2)$ F 2 Sin A -J3 Sin A = Cos A. E $Sin A (2 - \sqrt{3}) = Cos A$ F $2 - \sqrt{3} = \frac{\cos A}{\sin A}$ E $\frac{1}{2-\sqrt{3}} = \frac{\sin 4}{\cos 4}$ E $\frac{1}{2-5} = Tan H$ E E F $\frac{1}{2-\sqrt{3}} \times \frac{2+\sqrt{3}}{2+\sqrt{3}} = \frac{2+\sqrt{3}}{4-3} = 2+\sqrt{3}$ F E Tan A = 2+ V3. E E E

C G.: E E 4 5 $Cos A = \frac{5^{2}+6^{2}-4^{2}}{2(5)(6)} = \frac{3}{4}$ C $Cos C = \frac{5^2 + 4^2 - 6^2}{2(5)(4)} = \frac{1}{8}$ Show Cost + Cos C = 7/8 $\frac{3}{4} + \frac{1}{8} = \frac{6+1}{8} = \frac{7}{8}$ QED. ii) shar $Cos(A+C) = -\frac{9}{16}$ Cos(A+C) = Cos A Cos E - Sin A Sin E. Require: Sin A and Sin C. $\cos A = \frac{3}{4}$ $4^2 = 3^2 + x^2$ $\sqrt{7} = X$ => Sin A= 57/ Cos C = 1/8 $8^{\frac{1}{2}} 1^{\frac{1}{2}} x^{\frac{1}{2}}$ $\sqrt{63} = X$ 8 =) Sin C = 1/8 $\cos\left(A+C\right) = \begin{pmatrix}3\\4\end{pmatrix}\begin{pmatrix}1\\8\end{pmatrix} - \begin{pmatrix}J\neq\\4\end{pmatrix}\begin{pmatrix}J_{63}\\8\end{pmatrix}$ $= \frac{3}{32} - \frac{21}{32} = \frac{-8}{32} = -\frac{9}{16}$ OED.

Q17 h 5 $TanO = \frac{1}{h}$ $Tan(O+45) = \frac{6}{h}$ Tan O + Tan 45 1 - Tan O Tan 45 Tan(0+45) = $\frac{6}{h} = \frac{\frac{1}{h} + 1}{1 - (\frac{1}{h})(1)}$ (mult each by h) $\frac{6}{h} = \frac{h+1}{1-1/2}$ $\frac{6h}{h^2} = \frac{1+h}{h-1}$ $\begin{array}{l} 6h(h-1) &= h^{2}(1+h) \\ 6h^{2}-6h &= h^{2}+h^{3} \quad (=h) \\ 6h-6 &= h+h^{2} \\ 0 &= h^{2}-5h+6 \\ 0 &= (h - 2)(h - 3) \\ h &= 2m \quad h=3m. \end{array}$